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ELECTRIC HEAT IN DENTAL PRACTICE.[2]

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In the ordinary applications of heat, the gas and carbon products, while unpleasant and difficult to control, are not injurious; but in a few of the arts and some of the processes of dental practice the presence of these products makes it a serious matter. On this account we are glad to avail ourselves of a form of heat not new, but which has become practical only since the introduction of commercial electricity.

Electric heat differs from all other forms of heat in that it is not itself a process of combustion, neither is it a chemical action, nor one of friction. It does not consume and does not emit. But, apparently without any cause, the conductor of the current rises in temperature and radiates this pure heat of which we avail ourselves.

There are three terms in electricity which represent its very foundation,—the *ampère, volt*, and *watt*. These respectively represent the quantity, pressure, and power, and, although frequently used synonymously, are widely different. The ampère is the

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the Academy of Stomatology, Philadelphia, October 15, 1895.

measure, the volume of current, or, we may say, the active principle of electricity, the working agent. It is that which produces heat, electrolysis, and magnetism. We may say it is electricity itself, and we speak of it as a quantity of so many ampères.

The ampère is of no value, however, unless it is in motion, and the measure of that force which puts it in motion is the volt. While all so called conductors of electricity allow electricity to flow through them, they at the same time offer more or less resistance to its flow. To overcome this resistance there must be some force from behind, and this has been termed the volt. For this reason we speak of a current at so many volts pressure. The incandescent lamp glows because the ampère of current is flowing through its filament; but at the power station the dynamo is forcing the ampère in at one hundred and ten volts pressure, enough to carry it to the lamp and through its filament.

The watt is the term for power, and represents electric energy. It is the aggregate, or summing up, in one word. of the output or consumption of electric energy. It is the product of the ampères multiplied by the volts, and is readily converted into what we call horse-power by considering seven hundred and forty-six watts to be equal to one horse-power. It does not matter how the watts are made up, whether more of volts or of ampères; so long as their product equals seven hundred and forty-six it is one horse-power. A current of seventy-five ampères flowing under a pressure of ten volts will do work equal to about one horse-power, or a current of one ampère at seven hundred and forty-six volts will produce one horse-power. A sixteen-candle-power lamp consumes fifty-five watts; at one hundred and ten volts that would be half an ampère each, and thirteen such burning at one time represents an expenditure of one horse-power.

The heating element of electricity is the quantity or ampères. Volts do not heat; they only force the quantity through the conductor. If it requires six ampères of current at two volts to heat a cautery loop an inch in length, the same quantity of current at one hundred and ten volts would heat a piece of the same wire fifty-five inches in length. You will recall an electric exhibit at the World's Fair in which a bar of iron an inch in thickness was heated to redness in a few minutes. This was done by forcing through possibly a thousand ampères of current at a few volts pressure. Such a current is not dangerous to life, because the body offers so great a resistance that the few volts cannot force the ampères through.

Besides the quantity, or ampères, electric heat also depends upon another factor. There can be no perceptible heat unless the current meets with resistance to its flow. As the quantity is increased the heating power is increased, but this power is not apparent until the current meets with some resistance. The unobstructed flow of any quantity of the fluid does not produce heat. It is only when a poor conductor of electricity is placed in the circuit that we have this manifestation.

Electric resistance is of two kinds,—the resistance of the material of which the conductor is composed, and the cross-section of the conductor. All metals are comparatively good conductors of electricity, yet these vary in their conducting property. Copper stands at one extreme and German silver at the other. In the electric gold annealer and porcelain oven platino-iridium wire is used, because it is a poor conductor and does not oxidize or readily melt.

The size of the wire is the other factor in the determination of the heat. With a given length of wire the resistance increases as the diameter of the wire decreases,—that is, a small wire has less carrying capacity than a large one, so that when the same amount of current that is easily conducted by a large wire is forced through a small one, the condensation, I will term it, produces heat; so we would say that, with the same quantity of electricity at a given pressure, heat is produced according to the resistance of the conducting agent.

The atmosphere is practically a non-conductor of electricity, yet under certain circumstances it does allow the passage of an electric current. When a current has been established by bringing two terminals together, the electricity continues to flow, even after the ends have been separated. It leaps the intervening thickness of air in the form of the voltaic arc, and continues until the distance becomes too great. This action develops so much heat that it has led to the supposition that electricity is another form of heat. When the oppositely electrical clouds unite it passes through the atmosphere as lightning; when the Leyden jar discharges it is the spark; or when it lights the street-corner it is the arc. The heat of the arc is so intense that by our present methods it cannot be measured, but is estimated at 6000° F. With the ordinary Edison current I find that we can not only melt platinum and iridium, but in small quantities we can vaporize them.

Electric heat, when obtained by heating a conductor that does not oxidize, differs from other forms of heat in that it is without

gas, noise, or odor, and on that account is of special value in dental practice. Electric heat also differs from that obtained from other sources in that it can be controlled and regulated with the utmost precision. A given number of ampères, forced through a known conductor at a given pressure, always produces the same amount of heat, and it is possible even to calculate beforehand precisely how much heat will be developed by the different arrangements of volts, ampères, and resistance.

No case in dental practice, or in any other practice, for that matter, calls for a blast of air exactly at blood temperature so much as an almost exposed pulp, and no instrument so nearly meets this requirement as the electric warm-air blast. With air at a constant pressure, which is carried over electrically-heated wires at a constant heat, the air escapes from the syringe-nozzle at a uniform temperature. The heat can be varied by the operator in three ways,—by manipulating the air-pressure, by altering the electric heat by means of the rheostat, or by varying the distance of the syringe point from the cavity. After a little experience the operator can dry out the cavity without the slightest pain to the patient, and, if the air has passed through a wash-bottle of alcohol or any such agent, it carries its vapor with it.

The cautery and electric root-dryer are both familiar to you, and are examples, on a small scale, of the heating power of electricity. These instruments can both be successfully operated on the Edison current by throwing in about ten ohms resistance and taking off the cautery heat by what is known as a "shunt" current.

The value of any heat for sterilization is duly recognized, and for some time I have been satisfactorily using the electric oven, raised not quite to the heat of withdrawing the temper of the instrument. The heat may be maintained all day long, and the cleanliness and simplicity recommends it. Gutta-percha is softened with accuracy when placed on a soapstone slab resting on the oven, and the waste heat rising from the whole appliance is utilized for keeping water warm for the syringe.

There are two processes in dental practice which call for absolute purity and uniformity of heat. Upon recognizing the special fitness of electricity for meeting these conditions, I some years ago devised an appliance for annealing gold thereby, and one more recently for fusing porcelain.

The heat produced by electrically heating a mat of coiled platinum wire is the cleanest, most uniform, and most accurately

controlled of all forms of heat. The cohesive property of pure gold is supposed to be developed by heating to such a temperature as to drive off the gases condensed upon its surface, the principal of which is ammonia. The alcohol and Bunsen flame are ordinarily used for this purpose; but who is certain that better results may not be obtained by subjecting to a heat free from the products of combustion, as well as to the danger of smoking and the exposure to unconsumed gases? The electric annealer effectually overcomes these dangers. The heat, being derived from electrically-heated platinum, itself a noble metal, is absolutely free from gas of any kind. The heat is radiated from a mat of platinum coils, and is quite uniform at all parts, so that the gold is not only thoroughly annealed, but it is evenly annealed. It is impossible to evenly heat a piece of gold, held with a pair of pliers, over a flame of any kind. The thin edges of the gold will be fused, while the part between the pliers will be scarcely warm. The accuracy with which electric heat can be controlled also recommends its use for annealing. By means of the rheostat any degree of heat to the melting-point of platinum may be obtained. From my experience with the electric annealer, however, I find that cohesion is developed at a much lower degree than at first supposed. It is never necessary to heat even to redness, let alone fusion. The heat may be so low that the gold may be subjected to it for hours, or for days, even, without any injury, and still be highly cohesive.

Electrically annealing gold saves time in many ways. The gold requires no attention, is ready for use at all times, and, the heat not being high enough to take the temper from the plugger-point, this instrument may be used to pick up the gold, thus saving the time of changing instruments. After six years' use, I am free to say that next in usefulness to the dental engine is the electric gold annealer.

The latest practical application of electric heat in dental practice is the electric oven for fusing porcelain. From the time of Allen and Hunter, or from the very beginning of porcelain work, the question of heat has been a serious one, and the principal reason that continuous gum has not been more popular is the difficulty and uncertainty in the production of heat. The heating principle of the oven is an electrically-heated platino-iridium wire, or the gold annealer in the form of an oven. In using this new source of heat I departed from the old muffle-shaped oven to one more in keeping with this new agent. It consists of an upper and lower section, flask-shaped, with an inner cavity amply large enough to

contain a set of teeth, and of such form and arrangement of the wires that all parts receive the same degree of heat. Upon the whole inner surface is embedded the electric conductor, just deep enough to be supported while so highly heated, and yet to radiate its heat directly into the oven cavity. The upper half is hinged to the lower, which automatically makes the electric connection upon being closed. There are two openings through which the fusing process may be watched. These are placed at such positions that rays of light entering one will be reflected out by the plate through the other. This overcomes the intense glare of the heat, and at the same time brings the plate clearly into view, making it possible for an inexperienced operator to accurately determine the degree of fusion.

There are many other advantages offered by the electric oven.

The source of heat being a noble metal electrically heated, it will be readily seen that a heat is obtained that is unlike any heretofore used for this purpose; and since it gives rise to no products of combustion, it is an impossibility to produce what is known as "gasing," and porcelain fused by this method not only possesses unusual clearness, but appears to be more dense.

The accuracy with which electric heat can be regulated by means of the rheostat, the cleanliness and simplicity, freedom from noise and odor, are advantages over the older forms. With electric heat we have something definite. It is not affected by bad coke, bad oil, gas, or unequal draught. A given number of ampères forced through a conductor at a given pressure produces a heat as definite and results as positive as a rule in mathematics.

We can control electricity, and the opportunity is now open for any number of automatic appliances to regulate the heat according to the porcelain treated. I have up to this time devised a clock attachment to the rheostat whereby the current is gradually raised and cut off at a set time; second, a fusible button of porcelain placed in the oven at the time of fusing, which rings a bell when the porcelain fuses; third, an electric thermometer, whereby the temperature of the oven is quite accurately told by the rise of mercury in the tube; and, fourth, an ammeter, the swing of whose arm is in proportion to the heat of the oven.

These appliances are mechanical and quite accurate; but it is such a pleasure to sit down and observe the different stages of fusing that the experienced operator who has had to handle his case at a distance and with so much anxiety takes delight in watching and varying the heat at will, as he would play with a toy.

The cost of operation is very small indeed. The oven, as now made, consumes six ampères, which would be about two cents per fuse of thirty minutes.

In case a wire should burn out by accident, this break in the current automatically cuts the current off, so that no further damage is done, and it requires but a few minutes to repair the break in a way that is as good as new.

While the electric oven operates best when used on the Edison current, it is still very satisfactory on the fifty-two-volt alternating, the two-hundred-and-twenty-volt or the five-hundred-volt currents.

In the practical operation of the oven the procedure is very simple. The case is placed on the tray in the lower section, and the upper is then closed down. The lever of the rheostat is placed on the first button, and heat for thoroughly drying out the case is quickly obtained. When the operator is satisfied that there is no more moisture present, he begins raising the heat by pushing the lever to the right. If he allows two minutes to each button, it will require from twenty to twenty-five minutes to reach the fusing point. If it is a crown or a bridge, less time may be consumed in raising the heat without danger to the case, and it may be fused in from ten to fifteen minutes by throwing the lever over more rapidly. In practice I do not even measure off the time to each button, but fuse while I am operating. From time to time, as it occurs to me, I throw on two or three buttons at a time, according as the interval has been, until I have reached the third from the last button, on which it is allowed to remain until I have three minutes in which to give it my undivided attention. The porcelain is just ready to drop into a fuse, and upon throwing on the last button the successive stages and degrees of fusion are clearly made out.

In the first stage the porcelain is still in the powder form, and appears like snow. Presently it begins to drop into a fuse, and the snow-like appearance changes into a dead, indistinguishable mass; the particles are now beginning to coalesce. Gradually the surface, with all its inequalities, comes clearly into view, and presents a glistening appearance; continuing the heat a moment longer, the porcelain becomes more liquid, and the inequalities of the surface assume a more even appearance. Since the eye can be brought so close to the plate with the electric oven, and since the plate is brought clearly to view by the arrangement of the two sight openings, the operator is not guessing by the quantity of heat or the

general appearance of the plate, but he is actually observing the different particles of the porcelain itself, and for that reason the fineness of his fusing is always assured and at his perfect control.

When the desired heat has been obtained the lever of the rheostat is thrown back, which cuts the current off. At that very instant the heat begins to go down, so that there is neither overfusing nor loss of brilliancy in the gum color. If it is the first or second baking of the case, the stoppers need not be inserted, and the case can be taken out in a short time; but if it is the last fusing, after a few moments' time has elapsed and the case has become a dull red, the stoppers should be inserted and the case allowed to gradually cool.

It does not matter how nearly I have approached the ideal the prosthetic dentist has long sought in the invention and perfection of this appliance, there will be some who will find objection in some particular. It is but just to mention, however, that the objections have all come from persons who have not examined into the practical working of the instrument, but have stood afar off with forbidding gestures.

A prominent porcelain worker says it will be impossible to fuse thick portions, as well as thin, in such an oven. To that objection I would answer that in the old form of muffle it would be possible to do that; but in an oven which radiates its heat equally from all directions, as the electric oven does, the reasonable thinker will acknowledge that the thick would be fused equally as well as the thin, especially when we bear in mind that the porcelain is in the form of a powder, light and loose, before it fuses, so that the thicker portions are permeated by the heat as well as the thin, and practical tests prove this statement to be correct.

The older practitioners, who have been accustomed to working with large ovens which retain their heat for a long time, insist that the case must be taken out and put in an annealing oven. To those persons I would say it can cool in the oven just as well; not only that, but the case is not subjected to a sudden change of temperature, as must certainly occur when removing to the annealing oven; and on that account we claim it is rather an advantage to have the case remain in, and all cool down together. To those who think they must still do this, however, I would say they can easily do so until they find it unnecessary.

There is a common objection that it is an electrical instrument, and, like many such appliances, is liable to get out of order, or that

it requires an electrician to operate it. To that objection I can only say that it is much less complicated than a motor, and any one who is reasonable can operate it. On account of the special fitness of electricity in dental practice, it is becoming late in the day for any person to acknowledge his inability to take up the common applications of electricity, or to forbid their adaptation in his practice on general principles. He should bear in mind that we are not to-day dealing with the uncertain batteries of the past, but with the certain results of that Llewellyn genius, Edison.

It would seem that electricity has given us all we could ask for; and yet I am forced to say that the properties and applications of electricity are just unfolding, and the demands of dental practice of the future will keep pace with, if not in the lead of, electric progress. It is not a dream when I say the time is coming when electricity will have its place on the dental curriculum as much so as materia medica or metallurgy has now. No profession, science, or art has such varied demands in its practice as dentistry, and no single agent more nearly meets these than electricity.

THE PROFESSION AND THE MAN.[1]

BY REV. EDWIN H. HUGHES, NEWTON CENTRE, MASS.

Mr. President and Gentlemen,—A glance into a book a few years ago was rewarded by the interest of the following tradition, given now according to the memory of a hurried reading: There once dwelt in Hyderabad, India, a man whose name was Alhafed. One day there came to his fine country home a ministerial guest in the person of a Buddhist priest who gave to his host this crude account of the world's making: Back in the uncounted centuries, in the place of our revolving earth there was stationed a large, circular mass of thin vapor. In his own time the Almighty stretched forth his arm, placed his forefinger in the centre of this misty globe, and began to whirl it with infinite rapidity. The mighty circle became a flame and sped on in its fiery course. When the motion ceased the ball began to cool and contract. Mountains burst forth from its sides. The surrounding atmosphere rushed against it and

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[1] An address delivered before the American Academy of Dental Science, at Young's Hotel, Boston, November 13, 1895.

depressed the surface, making beds for the oceans. According to the conditions of the cooling process rock was formed in one place, coal in another, and diamonds in a third. But Alhafed asked the priest what a diamond was. The stone was described and its value stated. "Where are diamonds found," was asked, with sparkling eyes. The answer was that the gems usually lay where a swift stream passed over white sand. Alhafed immediately became discontented. He sold his home and farm, collected his moneys, and started out in search of diamonds. He went from land to land, and after wanderings, long and vain, he stood at last upon the shores of Spain and gazed out over the waters of the Mediterranean. The sun shone upon the wave-crests and reminded him of the long-sought riches. Crazed with disappointment he cast himself into the sea, and his poor body was carried away through the rocks of Gibraltar. Meanwhile, the man to whom Alhafed had sold his farm toiled on industriously. One day as he worked in his garden he saw a shining stone in the sand of a little stream. He picked it up, carried it into his house, and placed it on a shelf. Shortly there came to call the same Buddhist priest. He spied the precious stone in its carbon case, and excitedly asked, "Where did you get this?" The man led him forth to the garden stream, and stooping down the priest drew forth diamond after diamond. Alhafed's successor became fabulously rich; for he was the owner of the famous Golconda mines.

The untrustworthy legend gives a trustworthy moral. Men are ever leaving the ordinary with a view to finding the extraordinary. They do not expect to find diamonds while engaged in the plain pursuit of gardening. And very often in their proneness to consider the best things as distant and exceptional, they fail to gain the treasures that lie near at hand. Nor does this mistake confine itself simply to matters commercial and material. Supposing the weird story as history rather than as allegory, it is strictly true that the luckless Alhafed would have found more character as well as more wealth if he had not been seized with discontent of his occupation. And this moral view is the one which has point for us. For while it is not likely that some men of to-day will leave an honest profession and go in search of Captain Kidd's treasure or the casket at the rainbow's foot, we may yet be captured by the thought that the manhood for which we long and strive is to be gained and deepened only apart from the chosen work of our everyday lives. It therefore comes about that our calling sinks to the level of immoral drudgery or never rises, at the highest, above a

petty commercialism. It is possible for a man to lose himself, his brain, his heart, his very soul, in his profession. It has been told as a matter of joking that somewhere in the Old World there is a tombstone with this inscription: "John Jones. Born a man; died a grocer." But, ridiculous as the odd epitaph may seem, it really suggests the record of too many lives. It is not at all beyond sober truth to say that some, born as men and with the possibilities of high manhood, have died simply grocers or preachers or dentists. The intense specialism of our time has its advantages as pointed out to you by abler men; yet this same specialism has its dangers. If there be intelligent persons who contend that men are made by circumstances, we may, while being unwilling to allow the fulness of their claim, still grant that it will be hard to get a broad spirit out of a narrow work.

It is singular and anomalous, however, that in this age of rigid specializing there should still be the loud demand for breadth. It is hopeful that this demand is made not only upon belief, but also upon conduct. The time was when whole areas of life were put beyond the reach of morality. The edges of that dark period, sometimes even now, are seen amid the light of the present wider conscience. One—Mackenzie Wallace—says that in Russia such incidents as the following are still possible: A house-breaker, when in the act of robbing a church, finds it hard to extract the jewels from an image; he thereupon makes a vow that if a certain saint will assist him he will place a ruble's worth of candles before the saint's statue. A peasant prepared to rob a young man connected with the Austrian embassy in St. Petersburg. At length he kills his victim; but before doing so he enters a church and commends his bloody undertaking to the divine protection. A robber murders and rifles a traveller, but refuses to eat a piece of cooked meat, which he finds in the cart, because, indeed, it happened to be a fast-day. Extreme cases such as these will illustrate the efforts that have been made to mingle light and darkness and yet live in both. It was a distinct advance towards righteousness when it became the general verdict that a man's morality was the very essence of vanity and pretence, unless it kept him from outbreaking crimes. But our broadened thought now recognizes that this rule does not go far enough. It is at best simply negative. So there is at last heard a burning demand that the cheap and false distinction between things sacred and things secular shall be utterly wiped out; that men shall so use their constant work as to make it a means and expression of character; that the heart shall ever command

obedience from the head and hand, and that no longer professionalism shall devour manhood. It is sure that this lofty and heroic ideal demands a large and serious purpose. No superficial person will reach it. If there is anything so sad as to see a man who could be big in intention and in heart, toying with some little work or movement, it is to see a little man taking hold of some great profession with a puny purpose. We need to come to our regular occupations with a thoughtful and humane spirit. There is too much tendency to regard our work as a grim necessity foisted upon life, as a punishing curse, as a rank intruder. But such a view needs to be banished. The thoughtful man will find enough of moral bearing and beauty in his calling to lift it out of the degradation of drudgery or commercialism, and to set it far on high.

There will be, first of all, the knowledge that his work stands for a genuine need of human life. It is a fact that sometimes we grow weary of this claim, especially when it comes from the mouths of men whom we suspect not to use it sincerely. The simpering agent who is out for the bread and butter purpose, who yet seeks to invest his work with the purely benevolent and missionary air, often puts a heavy task upon our patience. But if hypocrisy be the tribute which vice pays to virtue, the protests of the insincere represent the attitude towards their employment that true men should seek to hold. For in truth every calling or profession stands for some necessity in life. There is no trade so humble as not to gain dignity from this view. The carpenter may say, It is absolutely necessary that people should have homes in which to dwell, wagons in which to travel, boats in which to sail, cars in which to ride, churches in which to worship. Viewing his work from the stand-point of its essential relation to life, the carpenter may rightfully claim that his occupation be somewhat exalted. The merchant may say, It is positively needful that people should be provided with eatables, with coal, with oil, with warm garments, with household conveniences. The mercantile calling represents, therefore, a plain and imperative need of the world, and should be held in high respect. The lawyer may say, The relations of men are not yet perfect. The organized life of society creates questions and crises. Rogues are alive and busy. Honest men are sometimes obstinate and unreasonable. The troubled world needs legal advice. Having such responsible duties, the legal profession should be given high regard. The doctor, whether of medicine or of dental surgery and science, may likewise make an impressive plea. He may

say, There are many ills that flesh is heir to. People are suffering. Subtile disease is floating in the atmosphere. Both the prevention and the cure of aches and pains are constantly needed. The people must rely upon a quick eye, a knowing mind. a trained hand in order that their afflictions be relieved. Having for its object the preservation of health and the alleviation of physical woes, the medical profession should be assigned a high value. Now, all these claims are just and should be readily granted. He who holds in contempt any vital employment of life and casts discredit upon its followers has a false idea and is in sore need of moral enlightenment. It is not contended that man in the midst of the work which supplies his personal wants should be forever posing with the air of a philanthropist. That would scarcely be an honest attitude. The urgent needs that press upon each one of us, the needs of shelter, clothing, food, will afford a large and proper motive for professional activity. But it is insisted that a man should view his work as it relates to other men, and not simply as it relates to himself. And he who in selfish greed applies his powers to his daily tasks, and while grasping gold in payment never considers that through the years he has been giving a good, safe contribution to life; that he has been sheltering bodies, satisfying hunger, defending the troubled, or relieving the suffering; he who fails to get this view of his tasks has all the while been becoming more of a professionalist and less of a man. The person who does not seek the utmost skill and buy the best instruments for his dental work, not only because he wishes to get larger prices, but also because he wishes to render better service to his customers, and to give an honest response to a need of human life, is most certainly sinking his manhood in his dentistry. It is surely not too much to ask that men come to their regular vocation in this generous spirit. The great poetess of England has some lines in which she teaches that the largeness of one's work will be determined by the individual purpose. Her statement is that it is better to be a tight-rope walker with a hearty thought than to be a poet with a superficial aim:

> "I would rather dance
> At fairs on tight rope, till the babies dropped
> Their gingerbread for joy, than shift the types
> For tolerable verse, intolerable
> To men who act and suffer. Better far
> Pursue a frivolous trade by serious means
> Than a sublime art frivolously."

If, therefore, a man has an employment which is not frivolous, an employment which makes an essential part of our great and complex life, he needs to face it with moral pride and earnestness.

There is, moreover, a thought which will give a man's work height and aspiration just as this already stated will give it breadth and sympathy. Any true profession or work has a divine side. There is a large suggestiveness in certain portions of the religious history which we call the Bible,—suggestiveness for this particular point. Frequently it is represented that the call to the very highest life and leadership came to men as they were engaged in their ordinary pursuits. The call to the most majestic position as general, legislator, and ruler that ever came to man was received by one who was quietly tending his flocks upon the mountain-side. The first king of a mighty nation went out on a faithful search for his father's herds, and instead he found a kingdom. The shepherds who kept the quiet watch over the sheep on the Judean plains were the men who heard the thrilling advent song and gained the honor of the first worship. Matthew was busy at the table of the tax-gathers when he was summoned to the discipleship that gave him immortal glory. John and James were engaged in the common occupation of fisherman when they heard the voice of authority, and pulled their boat over the blue waves to come ever nearer and nearer to Him who was to dominate the future. These incidental touches are suggestive. They mean, at the least, that the daily employment does not, need not, conceal the highest things from the worker. For it is not over-bold to say that to the reverent eye every vocation reveals things and powers which came from a divine agency. The carpenter handles wood which a power, not himself, has been a hundred years in making. The painter mixes colors which some power has driven across the ninety-two million miles from the sun and stored in metal and in planet. The drivers on our street-cars grasp the unseen force upon the upper and lower wires, and an invisible hand pushes the loads of busy men through the streets. There is no man whose work does not open up to him infinite distances, and who may not catch divine messages in the midst of his occupation. It was the thought of old Stradivarius, the violin-maker, that since a divine power had put the strange harmonies in the strings and cavities, he who so combined the conditions as to make the best instrument was in reality nothing less than a partner with the Infinite. It is no wonder that George Eliot, in her "Stradivarius," should exalt the man's dignified thought of his work. She represents the faithful artist as saying,—

"Who draws a line and satisfies his soul,
Making it crooked where it should be straight?
An idiot with an oyster-shell may draw
His lines upon the sand all wavering,
Fixing no point or pathway to a point;
An idiot one remove may choose his line,
Straggle and be content; but, God be praised,
Antonio Stradivari has an eye
That winces at false work and loves the true,
With hand and arm that play upon the tool
As willingly as any singing bird
Sets him to sing his morning roundelay,
Because he likes to sing and likes the song."

But his friend Naldo says,—

"'Tis a pretty kind of fame
At best that comes of making violins;
And saves no masses either. Thou wilt go
To purgatory none the less."

But Stradivarius replies,—

"'Twere purgatory here to make them ill;
And for my fame—when any master holds
'Twixt chin and hand a violin of mine,
He will be glad that Stradivari lived,
Made violins, and made them of the best.
The masters only know whose work is good;
They will choose mine; and while God gives them skill,
I give them instruments to play upon,
God choosing me to help Him."

What reason is there to prevent every honest man who loves his profession, who thinks of it as responding to human needs, from having this noble thought of his work? When once we rise to such a view we are sure to lift our employments with us above either wearying drudgery or ambitious greed.

And as every profession has a human breadth and a divine height, so also does it have a personal point. By this it is not meant that a profession provides a man with food and shelter and other needed good. This it ought to do, and does do. But the meaning is that every man's employment relates itself vitally to the man's character. It is not at all the intention to engage now in any subtile and refined moral psychology. We will leave that task to the schools. Men, however, are far too likely to have a cheap thought of the influence which their professional activities

shall have upon themselves. It would be a sad and disastrous view if we were driven to conclude that the things to which a man gives three-fourths or two-thirds of his conscious life were wholly immoral, so much so that the doing of them would in no real way contribute to his higher being. For many decades, Gladstone, the prime-minister of England, has engaged each week-day in chopping wood in the Hawarden forest. He has done this, not with the idea of supplying fire-wood for the castle, but rather with the idea of supplying himself with muscular power, so that he might meet the pressing demands of statesmanship. Now, it is simply incredible to think that the greatest statesman of the British empire receives a physical reflex influence from his work as a wood-chopper, and yet does not receive a mental and moral reflex influence from his profession as an official and reformer. There is a scientific doctrine of the persistence of force. And there is a sure doctrine of moral persistence. No man escapes from his own work. His profession refuses to be shaken off. It haunts him though unseen, dogs him though invisible, sleeps with him in the darkness, and comes back to the next day's work to toil with him again. Yet this is not the ordinary view. At the end of a day's labor one man drops his hammer and nail-pouch and says, "Done." It is not true. The day's work is only begun. Another man drops his yard-stick and says, "Done." It is not true. The day's work is only begun. Another man puts down his forceps or mallet, stops his whirling wheel, dismisses his patient, and says, "It is done." But if it be true that the physical skill gained from the day's task is to reside henceforth in the man's arms and hands, it is safe to say that the moral influence of that work is to remain ever in the man's soul. There is a true and deep sense in which every man's employment stays with him perpetually. The work that we do on all lines will insist on continued association with our souls. And this view of one's occupation will redeem from wrong views as to failure. We may see the house which represents ten years of a man's work and saving go up in smoke and flame. We may cry out, "It is too bad! All the man's effort has been in vain." But that is a superficial view. It deals only with man as an animal. It allows no height, no breathing space. The most essential part of the ten years' work is in the man, in the patience, industry, honesty, keenness, love, that have day by day rebounded to his soul. Certainly this idea deepens one's thoughts of his profession, and delivers it forever from a cheap and temporary place in his life.

It must surely be, then, that these three conceptions of employment will set our daily work on high. To the man who comes to regard his profession as responding to human need, as fitting itself to divine co-operation, and as pushing its influence backward forever on his own soul, that profession will forever contribute to manhood, and will forever call the growing manhood to its service. It will thus be seen that the tribute which Mrs. Browning in her Aurora Leigh pays to the world's moral teachers is no piece of poetic extravagance:

> "I write so
> Of the only truth-tellers now left to God,
> The only speakers of essential truth,
> Opposed to relative, comparative,
> And temporal truths; the only holders by
> His sun-skirts, through conventional gray-glooms;
> The only teachers who instruct mankind,
> From just a shadow on a charnel-wall,
> To find man's veritable status out
> Erect, sublime,—the measure of a man;
> And that's the measure of an angel, says
> The apostle. Ay, and while your common men
> Lay telegraphs, gauge railroads, reign, reap, dine,
> And dust the flaunty carpets of the world
> For kings to walk on, or our president,
> The poet suddenly will catch them up
> With his voice like a thunder,
> 'This is soul!
> This is life, this word is being said in heaven.
> Here's God down on us! what are you about?
> How all those workers start amid their work
> Look round, look up, and feel, a moment's space,
> That carpet dusting, though a pretty trade,
> Is not the imperative labor after all.'"

PROGRESSIVE DENTISTRY.

BY J. C. TOWNSEND, D.D.S., COLORADO SPRINGS, COL.

Progress in any and every form of education and enterprise is the result of reinforcing precept with experience. Education is the road by which we climb the steep and rugged heights of any pursuit. It is not only the medium by which we struggle for daily bread, but the source of all light, liberty, love, and lasting

happiness. Progress is fostered by the momentum of fever and passion of ambition, by the glory of attainment, the mortification of defeat, the attrition of man with man in association and co-operation. Life is thus valuable as progress accompanies our efforts. Wisdom is often gained from failure; sympathy with others, from anguish suffered by ourselves; strength from conquest; courage in adversity, because we see how little fate can really harm us; humility in prosperity, because we learn how accidental and superficial prosperity really is; charity, because we find with what slow progress the greatness and littleness of humanity is distributed; kindness, because the fire we kindle on our brother's hearthstone warms and irradiates our own thoughts, and often submerges our failures into success.

We progress generally by perseverance and union of heart; it is no spontaneous blossom or flowery beds of ease, but reminds us of the breeze that blows through the garden, catching the odors, delightful or repulsive, according to the flowers therein; so out of our lives and into the viewless world beyond we carry nothing but results. Thus our real selves or our talents are the resultants of many diverse forces; and the object of a well-defined specified education is to marshal these forces so as to produce strength, beauty, and wealth out of seeming weakness and discord. In this broad sense, our zeal for success and progress is necessarily co-extensive with our lives. Our progress, however, is limited, without unison of accord, and, of course, is optional. But we should aim at a certain definite work, and its merit is in direct ratio to the value we place on our talents.

In this world every man that wishes to succeed must be a worker and a fighter of some sort; and carefully-selected knowledge, well-earned and learned, is the Vulcan that forges our instruments, sharpens our tools, compounds our medicine, and prescribes all means for a cure.

Well tempered must be the steel and keen the blade, for in the battle of life each man has only what he can seize and hold against unrelenting competition. The brain that thinks and weighs, the eye that questions and discovers, the ear that listens and hears echoes of voices inaudible to disinterested ones, the keen intellect that keeps step with the march of sages, philosophers, and writers of every age and nation, yields a heart not only brave, but full of sympathy for our greatest advancement and success, physically, financially, and spiritually.

The characteristics of our nature must be at least threefold,

the fundamental principles of which are useful, ornamental, and elevating.

While recognizing the wide province of a thorough dental education, it is illogical for practical purposes to draw a distinction between the young professional man or his elder changing his location of city or State, as it is necessary for us all to be always fully equipped; but the general principles of honor, truthfulness, justice, charity, courtesy, public spirit, and due regard for the rights of others should prevail, and be urged by every man worthy of his calling.

We have specialized our work; it is theoretical as well as practical, and the underlying principles are illustrated by application.

We are glad to know that our colleges are striving, as well as individual benefactors, to train or teach us how to do, not simply how to know. With a specially adapted course of study, and a thorough, competent instructor and examiner, the object is near and clear, and methods direct and effective. Dentists are biased in favor of the tracks trodden by themselves during previous years. The so-called dentists, of all professional people, are under the greatest temptations to fall into ruts, and to regard with suspicion unfamiliar plans or methods.

We think that new advantages can be gained only by sacrificing older ones, and it is no easy thing to strike a judicial balance between the problematical ounces of profit in one scale and the certain and tried ounces in the other, especially with such stanch conservatives as we try to be. Besides, empiricism is as common in our profession as in medicine, and many of the so-called reforms are half-truths, and half-truths are proverbially more misleading than falsehoods. Experiment shows that lectures and demonstrations are not only beneficial and elevating, but entertaining and healthful on whatever subject, provided they are delivered to seekers of knowledge.

As a profession, we have made great progress in many ways, and yet much, however, remains to be done; and at best we are only standing or encamped on Pisgah, overlooking the land flowing with milk and honey; but to advance too fast is more disastrous than to stand still. Yet, if hurry is ruin, rest is stagnation. The great problem is the bringing us into more immediate relations with things themselves rather than with this absurd method of written examinations and the perusal of long articles.

An ideal is never so real or substantial as a thing. So far as possible the hand should touch, the ears hear, the eyes witness, the

feet traverse that which the brain desires to know. So we may realize what we conceived. Our minds are crammed with facts and theories more or less distorted and ill-understood, and useless because unapplied and unrelated to the real experiences of life.

The public should think we have real enthusiasm for learning, and not place us far below the best physician; and, in fact, not below any other profession as to science in our calling. But we believe, while the public is not enlightened, that there is no use of our resting under such condemnation, as all our faculties are throwing out their tentacula for the greatest good and success of our life, as any other profession or people, and our so-called selfishness for gain could be modified by union of thought and action.

Now, the question arises, What should every dentist know, and how can State legislation benefit his life and practice, and raise dentistry to a higher plane? Just what a good dentist in general practice should know is an exceedingly difficult question. Of course, we should have a good academic education; we should be known to have a good moral character, and a diploma from some one of the many reputable dental colleges in this or some other country; should write a thesis on some subject pertaining to dentistry once a year, and deliver the same to a State superintendent, and such thesis should be published in a dental journal or in pamphlet form for general distribution and information.

It is recognized that the chief aim of every man's life is self-support. And closely following comes the desire and natural inclination for the support of others. But equally as important is it that we should be true, not only to ourselves, but to those with whom we deal and are called upon to serve; and last, but not least, comes the desire for fame, and doing good unto our fellow-men. These four elements of a successful and honorable business-man, of whatever calling, constitute the foundation for a good dentist.

Now let us look at the different operations a good dentist is called upon to perform in general practice. The first important duty is to make a proper diagnosis of the conditions, not only of the teeth, but of the mouth and general system. Seldom do we spend enough time on these conditions. But the proper diagnosis is the forerunner of success, and he who has the power to arrive at such conclusions first, or with the most despatch, gets the most out of our profession or any other.

Then comes the adjusting of temperaments, adapting of circumstances, and ability to use the means at hand to remove the cause of all trouble arising from the teeth. Suffice it to say that

the dentist is called upon to serve in the capacity of a judge, physician, surgeon, artist, mechanic, teacher, and socialist. He is expected to know the general principles of anatomy, physiology, pathology, chemistry, materia medica, therapeutics, metallurgy, and to be an expert in all operations and mechanism pertaining to dentistry.

But we are not all constituted alike, nor have we the same talents, even when called to the profession of dentistry. And here arises the question, Should every dentist be familiar with all kinds of mechanism and medical treatment in order to practise at all? And should one examination, provided you remain in the same State, suffice without ever raising a voice anywhere again to show that we are alive and doing all in our power, not only to serve the public, but also to elevate our profession?

Where and how can we best show our honest intentions to elevate ourselves and our brother practitioners? First, we would say, by contributing liberally of our income to the support of general education, sustained by a good superintendent; then, through the general association of all practitioners, coming together at least once a year, and not only reading and listening until we become regular drones, but doers as well.

Now, every one can and should contribute something of advantage to the profession, and not only in a pecuniary way, but with the use of his best intellect. What faithful workers we are, so far as it is absolutely necessary, but naturally dilatory when there appears no necessity; but every good-thinking and conscientious man must admit that all that pertains to the general advancement of our profession is a healthy factor in our lives. If so, let us join heart and hand to bring this about, and there will be enough work for all, and to spare.

The question now arises, How can we get the greatest good and sustain the highest standing for our profession? It seems to us that could be accomplished through a State superintendent, elected by our State Society, approved by the governor, and given power of attorney through the Legislature. Now, such a superintendent should act as examiner and instructor for every dentist in the State, and visit every town where there is a dentist, and devote one day every year with each dentist, and give several public clinics and lectures for the dentists and public in all improved methods of practice.

Such a superintendent should be an ideal professional man. His remuneration should be provided for by an assessment of a

certain percentage of the professional income of each dentist in the State or district over which he has the supervision. We want to say just here that we think our public school systems set us an excellent example, inasmuch as their teachers have an examination from a State superintendent every year in order to sustain their progress.

We must devote more time to study and research, have our monthly associations wherever there happens to be a half-dozen dentists in the same town or city; let each member write a thesis on some subject once at least during the year, and, in reality, take greater pride in our profession, and the public will take greater pride in us, and will reward us accordingly.

The results obtained by having such a superintendent would be that of knowing and practising the best known principles pertaining to dentistry without experimenting so much and so long, and a greatly increased confidence on the part of the public when made aware of such proceedings, and naturally more attention and work for the same; also a greater remuneration for our work, as well as increase of business. So let our motto be, "The greatest means for the greatest good."

We must advance by or through some means at once, and all the time. Let us get down to the foundation and to solid facts concerning our future prosperity, and act on the same at once. Let us get at something on the line of universal progress, and the Great Ruler of all good works will help us and give us the increase.

Now, a man entering our profession should just as well be compelled to keep his knowledge of essential things pertaining to dentistry and add thereto as to be compelled to have in store an abundance when he starts. So let us contribute freely and justly to the support of our best advancement.

A State superintendent should issue a report and give all the information that exists, not only from our State practitioners, but all over the world, and request that each dentist use and try the best methods of operation, and report the results at least every three months. The superintendent should not only enlighten his brother practitioner, but the public as well, and urge regular and thorough attention of the people to their teeth. In other words, he should stir up business and blow the dentist's horn. He could control indolent and worthless practitioners by a public announcement of such in his report to the people of the vicinity in which the intruder lives.

In conclusion, I would say that everything and everybody needs

nurture, and dentists especially need association, which should be the best.

Permit me to say that I think the necessary information of all branches pertaining to dentistry should be marked or compiled in book-form by a national board of dental education, and a supplement added from time to time. Now, this means that every dentist who has the greatest pride and success of his profession at heart should be able to learn quickly and thoroughly all the necessary knowledge, and have the same at any time.

Reports of Society Meetings.

AMERICAN DENTAL ASSOCIATION.

(Continued from Volume XVI., page 690.)

August 7, 1895.—Second Day.—Evening Session.

THE meeting was called to order by Dr. Watkins, who presided, and the minutes of the previous session were read and approved.

Dr. Boice offered a resolution that the treasurer be instructed to get a new set of books; also a treasurer's individual badge.

Dr. Abbott.—I would like to know what that badge is intended for; for the treasurer or for every individual who pays his dues?

Dr. Boice.—It is not a badge for the treasurer alone. It is a badge which is given to every gentleman when he pays his dues.

After some discussion the motion was laid on the table.

The chairman of the Committee on the World's Columbian Dental Congress stated that the proceedings which have been sent to the members is the only report that he has to make. The most important report is the one which Dr. Marshall will make as treasurer of the World's Columbian Dental Congress.

Dr. Marshall.—I have prepared, for the benefit of the Association, and also for publication in the journals, a report of the financial condition of the Congress, its receipts and disbursements. In that report I have arranged to have each State and each society get credit for the amount of money which it subscribed before the sessions of the Congress, and also what we received from the memberships.

The report was accepted.

Dr. Crouse moved that the consent of this Association be granted the secretary to cast a unanimous ballot for Dr. Lyman C. Bryan, United States vice-consul to Switzerland, as an honorary member of this society.

Motion carried.

In the absence of Dr. Crenshaw, Dr. Fillebrown reported on behalf of the committee appointed on the President's Address, as follows:

The committee beg to submit the following:

1. That the American Dental Association adopt the suggestion contained in the address, looking to the erection of a suitable monument to the memory of Horace Wells in recognition of his bequest to our profession, and also to incorporate the addresses of Drs. Fillebrown and Garretson in the published transactions of this meeting.

2. We recommend a continuation of the committee appointed to meet and discuss with a similar committee from the Southern Dental Association the feasibility of bringing together the American and Southern Associations in one body.

3. We recommend a further and more persistent effort throughout the society to the suggestion in the address for the appointment of dentists in the army and navy.

4. We would also ask the appointment of a well-selected committee to report twelve months hence upon the suggestion of the address with reference to the condition of the mouth and teeth, and the bearing this must have in the matter of obtaining life insurance.

5. Your committee regard the suggestion of the paper touching the education of our children as one of great interest and importance, and suggest a further discussion and expression of opinion from this body upon the question.

6. We recommend the suggestions of the address to medical colleges, asking the appointment of competent lecturers upon the diseases of the mouth and teeth as a means of good to the clientele of the physician.

7. Your committee regard the suggestions of the address touching professional ethics as furnishing matter for serious reflection, and ask a discussion and expression of opinion from this body with reference to this vexed and important question.

William Crenshaw,
Thomas Fillebrown,
A. H. Fuller,
Committee.

Dr. Louis Jack then read his address, entitled "The Struggle for Professional Life, and its Relations with Practice." An abstract of the same follows:

He who has determined to enter into the practice of dentistry has commenced a course which in many of its aspects is attended with large and exacting responsibilities. He is to have in his keeping the preservation of an extremely essential portion of the human body, the derangements of which are far-reaching and fraught with general disturbances of the whole bodily economy. Therefore he requires the mastery of the principles and sciences which are related to the practice of medicine and surgery, added to the special knowledge of dental science, and also the skill in techniques and mechanics demanded to give practical efficiency. The student should keep always in view that it is a right principle to devote the strength of his mind and body to the requirements that scientific study and practical preparation impose upon every intelligent and rational mind, and that it is wrong and damaging to waste precious time in early manhood which should be devoted to study and research. The plans of the present system of the better colleges are intended to correct the disposition of the students to shirk duties, and to check the bad habits of overloading the mental stomach at the end of the term with a mass of indigestible pabulum which had better have been taken meal by meal. The brightest and the most useful men of all ages have been those who have taken up the battle by faithfully devoting themselves in their earlier years, in order to throw off the leaden weight of dulness and master their mental environments. The adjustment of plant, animal, or man to his environments is really what is meant by the familiar term, "The struggle for life." This struggle, which involves the survival of the fittest, is not as harsh as it may appear on the surface. It is upon all of us, and we cannot escape from it. With animals it is for bodily sustenance; with man it is as well for mental, moral, and spiritual growth.

The great purpose of life is the development of character. This is done by the toilsome rearing of truth upon truth, and cementing them into the mental constitution. Loyalty to one's profession may without impropriety be fittingly compared to patriotism, for to honor is to do everything which can render good to one's country, whether the service be of mind or the yielding up of life when it is required. We must be ministers and soldiers, as there may be need.

The foregoing does not appear on the surface to have much

practical relation to the practice of dentistry; but is it not plain that the further elevation of dentistry depends upon the intellectual training of the younger men and the motive forces which animate all who engage in this work? We will often find that the result of the struggle which brings about the survival of the fittest will produce a broad and general advancement of the practice of dentistry, to the lasting and personal benefit of every honorable person engaged in the splendid and beneficent service which that profession is to mankind.

Dr. Jack, as chairman of Section III., reported on behalf of that committee. He stated that a marked feature of the period has been the development of the use of electricity in dental caries, for packing and finishing metal fillings, and in connection with therapeutic cataphoresis. Attention is called to a method of finishing gold fillings by hand-burnishers introduced by Dr. Libby. The combination of tin and amalgam beneath gold has been on the increase. Attention is called to the overwhelming increase of plastic filling-materials, many of which are very indifferent, but through extensive advertisement are praised into too wide an acceptance. The use of them raises the serious question, in view of the fact that most of the fillings are of short duration, whether dentistry as an art and our standing as a profession are not in danger of suffering a serious decline, and whether American dentistry is not falling into the conditions of practice which greatly prevail in Europe.

Dr. D. D. Smith, of Philadelphia, read a paper entitled, "The Office and Eccentricities of the Dental Pulp," of which an abstract follows:

Some months ago there was a talk before the Odontological Society of Pennsylvania on the office of the dental pulp. In the discussion that followed a wish was expressed that the subject-matter of that talk might be embodied in a paper to be read before the American Dental Association. In accordance with that wish the following has been gathered up for this occasion:

It is hardly to be expected that there can be presented to a body of dentists to-day anything specially new upon the office of the dental pulp. This organ and its functions have been so fully studied and are so thoroughly understood that it is doubtful if anything really new can be presented. It is possible, however, to get a new view of an old subject, as we might take a picture which has hung neglected for a long time because of an unsatisfactory light, and by rehanging it so change the light thrown upon it that it appears like a new picture, and there comes to us a new

revelation of the artist's meaning. All we can hope to do at this time, in looking at the office of the dental pulp, is simply to present certain phenomena and facts in new groupings, and possibly to hang the picture in a better light. It is not the office of this paper to study the etiology of the teeth, or to look minutely at the formation of the teeth,—the enamel, dentine, and cementum. Neither is it to treat of the pulp action in the original formation of these structures. The intention is rather to speak of the part the pulp plays in the economy of tooth solidification, and the deductions therefrom. It is well known that the different formations which make up the body of the tooth receive light and nourishment from two distinct sources: one from the pulp, the other from the pericementum of the root. The full appreciation of this fact and the phenomena arising from it will greatly assist in establishing substantial and rational methods for saving the teeth. The pulp of the tooth is the central figure and the important factor in the tooth. To it is committed the care of the newly-erupted tooth, and its first work is to readjust, recalcify, consolidate, and strengthen and sustain the enamel and dentine. As a rule, the earlier a tooth is developed the more readily it yields to decay. The more time taken for calcification before eruption the greater the resistance to decay manifested on the part of the tooth. The young teeth are frequently erupted into environments which are most unfavorable to their development, and there begins at once a ceaseless contention between the forces acting externally to destroy it and the vital forces of the pulp to protect it from within. Just in proportion as the pulp is able to do its work of nourishing, consolidating, and maintaining the osseous parts will the crown at this period be protected from decay. Hence the emphasis that should be placed on keeping the pulps of young teeth in a condition of healthful activity.

The law of use governing tooth consolidation, widely known among patients, would do more to arrest the extensive decay now prevalent between eight and fifteen years of age than dentistry can ever hope to accomplish by mechanical means. Too much importance has been and is attached to inheritance as determining the character of teeth. Use of the teeth in mastication, and thorough cleanliness will alone produce that exercise required by the pulp and peridenteum. The sixth-year molar, which erupts at a period when little thought or care is given to the teeth, is commonly the one over which the hardest battle for preservation is fought. The effort should be to save it, but with a living pulp.

Devitalization of the pulp at an early period of life carries with it a more or less rapid retrogressive change in the quality of the tooth-material. Fillings may prolong the existence of a tooth as such, but with the arrest of vitality in the tooth there is cessation of all vital sustaining action. The imperfectly calcified enamel and dentine built into the tooth are now in contact with devitalized connective tissue, which in the imperfectly consolidated tooth becomes a source of disintegration and assists in its destruction. The pulp is to the erupted tooth, whether temporary or permanent, the only source of life and sustenance, and it is of the first importance that it be maintained in a condition of health. All encroachments upon it through decay or manipulation should be carefully guarded against. So important is this that no effort should be spared to protect it from the progress of decay and injury. Its preservation in full activity means the deposition of better material, although parts of the crown may have been cut away. This opens up to us the whole subject of exposed pulps and the method of treatment, a domain into which I do not propose to enter. It has been said that the pulp is the only medium through which the dentine and enamel of a tooth are changed. It seems more than probable that the future may discover that the action is not confined to enamel and dentine alone, but that it extends into the cementum, exciting changes whereby true bone-structure is converted into a tissue resembling dentine more than cementum. Although a tooth may be fragile and imperfect at eruption, if you get it into a condition of use and cleanliness and the pulp is protected, the pulp will build up the tooth into an organ of good use. Instances of such cases are in the minds of all men of experience and observation. But we usually consider those cases exceptional rather than true expressions of the law of pulp action. Are not our literature and the teachings of the past and present wanting in that a position of supreme importance is given to operations on the external part of the tooth, while overlooking the important factor within the walls of the pulp-cavity? I would like just here to answer a question which was asked by one of the gentlemen in discussing dental education this morning. It was asked, What shall we do for the teeth of the poor? It is not strange that the question is asked, when we look abroad and see the condition of the mouths of a large percentage of the community. This question has come to every thinking mind. There is one work which, it seems to me, devolves upon the profession of dentistry, and which can be undertaken in its incipiency in this organization, and

that is to emphasize the matter of education. Go into our public schools to day, and ninety-seven per cent. of all the scholars that you find there will be suffering with troubles of the teeth more or less important, much of which might be obviated by emphasizing just this single point, by forcing instruction into our public schools, by compelling the children to come to school with clean mouths, as they are required to come with clean hands. An influence might go out from dentistry into the community which shall reach to the lowest dregs by educating them as to the importance of their teeth and the importance of pulp action, so the tooth can be erupted into proper environments.

Does there ever come to a tooth a period in life when the pulp, with all the importance attaching to it in early life can be dispensed with? It is the contention of this paper that a pulp which has maintained a healthful existence in a tooth for twenty-five or thirty-five years has accomplished for that tooth all that it will or can do in the way of strengthening its osseous structure. The maximum of dentistry is reached with full maturity. Before this time the pulp forms part of the tooth; afterwards it can be dispensed with. If it remain within the tooth, there is an unmistakable restriction of its function and limiting of its activity, and sometimes there seems to be interference with the usefulness of the tooth. Having completed its work of consolidating the structures, it will sometimes commence to build in upon itself, circumscribing its boundaries, or depositing nodules of dentine or enamel, or pulp-stones, sometimes ossifying the whole coronal portion, and sometimes mummifying the entire substance by injecting into the tubuli an offensive coloring-matter, which baffles all efforts for its removal. Later in life we find teeth which have been decay-resisting for fifty or sixty years seemingly changing in structure, returning again to the conditions of childhood, as evinced by their yielding more readily to decay. Continuing on a little further, a few years more perhaps, it is not uncommon to find that decay has become extensive throughout the remaining teeth, along the gum margin particularly of the front teeth, where fillings have preserved them for twenty years or more; the teeth begin to deteriorate, and we find a change in the structure which is not imaginary, but positive. The tooth has softened. If refilled, after a short time they begin to darken around the surfaces. The fillings will no longer arrest decay as they have previously done. What has brought about this change? Is it not the pulp that previously rebuilt and consolidated the osseous structure of the

crown,—the same pulp again at work, but now transforming the compact material which it built in that tooth into a condition wherein it yields much more readily to decay? What are the practical deductions from this action of the pulp? Suppose we take a tooth at the period of life when it is at its best, when the dentine and enamel are strongly consolidated, and destroy the pulp. What is the result? Only one result can follow. By no vital process can there be later in life any change of the compacted material of the dentine and enamel into any better or poorer formation. As the tooth is when the pulp is destroyed so it must remain, except as to those changes which take place through the gradual disintegration of the internal structures of all pulpless teeth. Have we injured the tooth in any material degree? What is the prognosis of a tooth with pulp destroyed at the period of maximum consolidation? With present methods of treatment, who would venture the prediction that a pulpless tooth would not continue in service to the end? If the pulp is so important at one period of life, and of little importance at another; if it is indeed a builder in early life and a source of disintegration in old age, shall we not revise our estimates of the value of the dental pulp?

One other point which this paper would simply hint at is this: It has been said that the future may demonstrate as a fact what is now a conjecture,—that the action of the pulp in rebuilding the osseous structures of the tooth is not confined in its operations to dentine and enamel, but extends an influence more or less potent into the territory of the cementum, depriving it of much of the characteristics of true bone-structure. If this be so, there comes a suggestion respecting some of the unexplained manifestations of pyorrhœa alveolaris. In this connection our first remark is, Pyorrhœa is seldom or never found in connection with young teeth. It seems to be a disease of adult life, generally of middle life. It is an affection not found in connection with soft teeth, nor with teeth much given to decay. So true is this, that in typical cases of pyorrhœa there is no decay in the teeth. It is never found in connection with devitalized teeth, where devitalization preceded the manifestation of the disease. In a mouth with extensive and uncontrollable pyorrhœa, it will be noticed that the disease is confined to the strong, well-formed teeth exempt from decay, not necessarily unfilled, but to teeth with living pulps. Our deductions therefore are these: If it should hereafter be found that the pulp sends a consolidating tendency or influence into the territory of the cementum, rendering it obnoxious to the pericementum be-

cause of too great consolidation, there will be found favorable conditions for the beginning of pyorrhœa, and we shall find in it the probable solution of the exemption of pulpless teeth from pyorrhœa. We shall also find why soft and young teeth are not affected, and why it is pre-eminently a disease associated with the hard, strong teeth of adult life. It is of vital importance that the cementum should be kept unimpaired and unchanged. It matters little what becomes of the pulp in a mature tooth. If the cementum is in a normal condition, it can be restored.

From the foregoing we must conclude that the dental pulp is an organ of the greatest importance up to the period of consolidation. After that, for a considerable period, as it would seem, it is of little service to the tooth, and later in life it may even become a source of injury and trouble. Of the gentlemen who have written of pyorrhœa no two seem to agree as to its etiology and methods of treatment. Age has not been considered a factor of any importance in connection with it, nor the character of teeth. It has been treated as a disease of local or constitutional origin, according to the view of the writer.

If what has been said will bear investigation, we must consider age, tooth-structure, and pulp-action, as well as local irritants and constitutional conditions, before it can be said that the origin of this troublesome concomitant of dental practice is satisfactorily defined.

Dr. J. D. Patterson, of Kansas City, then read a paper entitled "The Necessity of, and Methods for, Better Pulp Protection in filling Teeth," of which the following is an abstract:

In considering this subject, no reference will be made to pulps which have become exposed or in a pathological condition very near exposure, but to fairly deep-seated cavities in the teeth of patients under twenty-five years of age, which are usually filled without any endeavor to prevent pulp irritation, the operator believing that no considerable trouble will be possible, either from the presence of a filling with the property of conducting thermal changes, or from the irritant nature of filling-materials in common use. In this class of cases every observant practitioner has had his attention directed to the number of severe pathological conditions arising in after years from the death of the pulp. Where there is immediate or soon occurring trouble after a filling is inserted upon a nearly-exposed or pathological pulp, the removal of the filling and usual treatment bring immediate cure; but where the pulp-death comes from no continued irritation, the danger is

greater. The patient's attention has not been called to the tooth until months or maybe years have elapsed, and when from an anæmic or diseased constitutional condition the dead remains of the pulp-tissue overcome the healthy function of the parts, the operator, be he as wise or as skilful in treatment as any, must often fold his hands, utterly unable to abate the alarming and rapid processes of destruction.

I will attempt to make a diagnosis of these cases, and show why they are so difficult to control. When the irritation to the pulp is slight, as it must be when it penetrates through the wall of dentine, the pulp responds without noticeable pain to the physiological action. If the putrid pulp contents are rapidly forced through the apical opening, the result is an immediate abscess; but in the slower process, from slight irritation, the poisonous matter infiltrates into the surrounding tissue in small quantities and intermittently, and Nature with its wonderful facility for destroying invading poisons, destroys the pathogenic bacteria and absorbs the detritus when it comes in small quantities. In this process, however, the investing tissues become weakened, and weekly or monthly the putrescent pulp matter again comes from the apical opening. Pathologists well know that an abscess voiding intermittently will seek new points of outlet, following more easily the healthy tissue than cicatrized territory. In this way each fresh invasion of pus will prejudice new territory, until irritation after irritation of the parts has placed the surrounding alveolar process and periosteal tissues, often to a distant point, in a weak and predisposed condition. There is no new power left in the tissues to withstand the attack, and at times great loss of process and teeth supervene through rapid inflammation and necrosis.

For pulp protection a variety of methods and materials have been adopted. Gutta-percha easily stands in first place, but it cannot be readily used except in deep cavities, where there is room for a good layer of cement over it, upon which to condense gold. Non cohesive gold in my practice is used for pulp protection almost to the exclusion of all other materials. Those who have been in practice many years cannot fail to notice that the old-time non-cohesive gold-fillings, which forty years ago were not universally used, upon removal were often found placed over pulps which were protected only by an extremely thin layer of dentine, and in this position had not caused any uneasiness from thermal changes. In these cases, if cohesive gold were used for refilling, the pulp was at once affected by hot and cold liquids and cold air,

and even resulted in pulp-destruction. The philosophy of this difference in conducting power, between the two forms of gold, is not difficult to trace. In the non-cohesive filling, it is in no way a cohesive mass, cannot be welded together, and when a cavity is filled with layer after layer of this gold, the thermal shock is conducted along the layers and not down to the bottom of the cavity, for there is no intimate connection between the different particles of the different sheets. If you are annoyed with the effects of cold and heat in a cohesive gold filling, and will remove such filling, and without further treatment place over the pulp a pad of non-cohesive gold as here described, I can assure you that the trouble will at once disappear, and that afterwards you will treat all deep-seated cavities in this manner.

DISCUSSION.

Dr. Friedrichs (of Louisiana).—I shall only refer to the first paper read. I understood from that paper that a dead tooth, if the pulp be removed, is better preserved than one with the pulp alive. That certainly does not coincide with my experience. My experience in thirty-three or more years of practice is that the moment the pulp is destroyed the tooth is limited in regard to its duration; and also by observation I know that when the pulp is allowed to remain, as long as that tooth exists it will endure, for I have seen them worn down to the gums. The Almighty would not have placed us in such a position that after a certain period of time an organ that was built up should be destroyed before the period of our demise. He certainly intended that those teeth should last us as long as we lived, and we have plenty of cases where people have their teeth in good condition until they die. In regard to the cases of pyorrhœa alveolaris, I cannot see where the pulp has any action in that respect whatever. If such were the case, why do you find caries in mouths where only one tooth is affected and no others? Extract that tooth, and ten chances to one not another will be affected. Such cases have occurred to me in my own practice. If the pulp really were the cause of or would induce this condition, everybody would be affected with pyorrhœa alveolaris. Do you find that to be the case? Of course not. You find those lesions in the human body where one man may be affected with a certain thing, but it does not follow that the whole human race is affected. Where you have the pulp irritated, the usual trouble is the reflex condition of the pericementum. If the congestion remain in the pulp, pus is formed and the pulp is annihilated. There is no such

thing in the pulp as an absorbent. There is a period of disease in dentistry, in regard to youth and old age. When senile decay steps in, as Dr. Atkinson said, it is want of proper nourishment, and those conditions then follow.

Dr. McKellops (of St. Louis, Mo.).—I think it is a pity that the very subject that every man here is interested in should go by without being discussed. These papers that have been read are very important, and they certainly should not be allowed to pass. More than half of the children who go to public schools are rich and able to take care of their teeth. They are not the poor children, as Dr. Smith represents. Go to your high schools, and you will find that the majority of those children are able to have their mouths attended to. I am interested in this matter of the pulp, and it is very important. When treating the sixth-year molar of a child you find a small portion decayed; you put in an amalgam or gold filling, and it is the most difficult thing in the world. You must have the confidence of that child, and learn to handle it with care, so you can accomplish some good result; and you do not do it by putting in any gold or amalgam filling, but by putting in carefully an oxyphosphate filling and watching it until the child is fourteen years of age; and I defy any man, if the filling is properly prepared and put in, to find a particle of decay there. When the child is fourteen years old, then put in your other filling, and put it in so no power on earth can affect it. Of course, some of them will wear out, but a platinum filling will last. I want the gentlemen of the profession to try this. You can come very near to matching the natural teeth, but if you put in gold the appearance is entirely different. It takes more care, of course, but it can be done. There has been no increase in that kind of work. There is no more platinum gold sold than there was years ago, but there is no better material that a man can use. With that material I can beat any inlay that was ever put in, and come so near to matching the teeth that it is almost impossible to notice it at a short distance.

In the charts that Dr. Patterson showed there must be a disease lurking in the system that causes all this trouble, syphilis, or something of that kind, that he has not studied out. You get up in the morning, and clean your mouth, and rub your finger along the glands, and you will get out a great quantity of mucus. So many people do not clean their teeth properly. I have used the fillings of gold for more than forty years, and I am a man who uses nothing but gold in my work without oxyphosphate. With brains,

intelligence, and as bright minds as any society in the world, our men should not let the opportunity pass of discussing these papers. As a person begins to get old the nerves recede in the tooth; ninety per cent. of this trouble is caused by the secretions in the mouth, and we do not try to remedy it. I want Dr. Black to get some of those platinum fillings and to test them. If you take the oxychloride of zinc and put it in a tender tooth, you set up inflammation; but take a little iodoform and glycerin, and place it over the tender pulp, and a little asbestos paper over that, place in your oxyphosphate filling and let it set, and you can then put in any filling you want, and it will not irritate the tooth.

Dr. Taft (of Cincinnati, Ohio).—While hearing these papers read, the thought came to me that the first one should have come under the Section of Physiology, and that the second one should have come under the Section of Pathology, but that is not a matter of great importance. I simply want to emphasize a few thoughts that were expressed by the writer of the first paper in regard to the function and value of the pulps of teeth. The position he takes in regard to the use of this organ in the central portion of the tooth is correct, as every one knows, so far as the teeth of young persons are concerned; during the time of growth, development, perfection, and maturity of the tooth the pulp is a necessity. The tooth derives its nutritive supply from this source, and it goes on from its primary condition to its perfection (speaking of the permanent teeth); but what about it after this period? Is it of any value after the perfection of the tooth? Were it not of value in the economy, Nature would have made provision for its removal. Does the tooth need any nutrition after twenty-five years of age, after it has been entirely calcified? Can any one decide in any given case when the period of perfect calcification is reached? It is reached much earlier in some cases than in others. It is a fact patent to every close observer that the teeth in many instances do not seem to be complete in calcification at thirty or thirty-five years of age. How do we know? Up to this time they have remained in a comparatively deficient condition in this respect. They become more and more dense after this time. Does that increased solidification take place after the pulp is destroyed? Never. What are the constituents of dentine and enamel? Two general classes, organic and inorganic, vital and non-vital, the vital just as important an element as the non-vital. The vital must have supply and nutrition. When its life is taken away, deterioration at once begins, not in the broad sense manifesting disintegration

at once, although that comes afterwards. The organic portion of the tooth is not nourished as when the pulp is living. Both the dentine and enamel receive their supply from the pulp of the tooth, and when this organ is destroyed this process of nutrition is also destroyed. It will be found that after a pulp is taken away, disintegration and breaking down of the tooth takes place without the ordinary process of decay, simply by a deterioration of the tooth-structure. That, of course, appears upon the organic material, and not the inorganic. Often we find a devitalized tooth with a portion of it broken off. The enamel far more readily breaks down, and disintegration occurs wherever a thin edge is left, or where there is an exposed edge or border, because of its weakened condition. That is true, also, of the dentine, because that has within it a much larger proportion of organic matter. I remember the case of an excellent tooth in a mouth in which all the teeth were excellent, except that the first permanent molar by decay had lost its pulp. There was a large cavity running through from front to back. Upon that tooth Dr. Atkinson many years ago performed an operation, filling up the pulp-chamber and building up the tooth. The statement was made that the tooth would last the lifetime of the patient, but it did not. It was a firm, solid tooth, as was its neighbors. That tooth lasted about eighteen years, and did good service, except that about twelve or thirteen years after it had been filled the edges of the enamel began to break away, and about eighteen years after it was filled the whole inner wall broke away. Examination revealed the fact that there was no ordinary decay. It was very slightly decalcified, but there had been such deterioration of the organic portion of the tooth that it was not able to withstand the force that was put on it in mastication and gave way. Within a year the other side broke off in the same manner, showing clearly that there was a deterioration of the structure or character of the tooth that was fatal to it.

I was very glad to hear the writer of the paper refer to the care of the teeth, especially in regard to mastication. If we say we know how to masticate properly, we sin against light and knowledge. We had better say we do not know. I have often asked dentists how much they urge their patients to masticate properly? Some of them say they never speak to their patients about it, and very rarely have I heard one say that he gave any special information or urged his patients to masticate thoroughly. It is not only the mastication, but the thorough insalivation, that is required. Those persons who masticate their food most thor-

oughly have the best teeth. They have the least dyspepsia and the best-nourished tissues in the body all through, and are better able to withstand all attacks of disease than those who do not masticate thoroughly. I know from observation that the majority do not masticate their food in anything like an adequate degree. I have noticed in this village a number of dentists, and I have observed that they take their meals in a few moments' time, the food not being thoroughly masticated nor thoroughly insalivated. I believe if the dentist can impress upon his patient the importance and the necessity of thorough mastication, that he has done one of the greatest services for his patient that is within his power. It is better than treating the diseases and conditions which we so frequently meet. It is hygiene of the mouth and the teeth, and it is for the benefit of the entire organization of the patient as well as of the teeth. The mother, the father, the nurse, and anybody in care of a child should notice it as early as three years of age, and teach it to masticate thoroughly and properly. The habit will stay with it through life, and prevent many of the ills and distresses that assail us.

Dr. Truman (of Philadelphia).—The discussion seems to have lost sight of the first paper. If the point brought out by Dr. Smith be true, it is an important factor for consideration. I am not prepared to believe that it is true. I think the discussion ought to lead in that direction. If I understood the paper, it was that the pulp from early life passes on to old age, and eventually degenerates, and resorption takes place. If this be a fact, it is an important one. I think all the evidence we have had in the past shows that there is an increasing density of the teeth up to the time that they are lost in advanced years, and that there never comes a time when there is resorption. This has been demonstrated recently by experiment. It has been theoretical heretofore. If I understood Dr. Black's series of papers in the *Dental Cosmos*, there is a gradual increase up to old age, and I would like to hear him speak on this point. I know from my own observation, microscopically and otherwise, that there is an increase in density in the structure of the tooth, but I know of no time when there is a resorption. There is at times a pathological condition apparent where the pulp destroys the tissue, but that is not what Dr. Smith means, if I understood him.

Dr. Black.—I would be glad to say a few words on this subject. The exact figures in regard to this matter any of you may study in the *Dental Cosmos* for May, 1895. It is a pretty long study, and

will require some time to work itself out from the figures there so as to give a clear view. It is a fact that the teeth become more dense and their specific gravity becomes greater from youth to old age; but this difference is not great. It is a difference that requires the finest powers to demonstrate. The increase in strength is not very great. The difference between teeth is not very great, but it is certain. Follow those differences and you will see. Take the teeth of a young child, and you find average density; take the child in the teens and then in the twenties, and you find an increased density; then up to thirty there is slower increase, and from thirty to forty or forty-five the increase is very slight. From forty-five to sixty the increase in density is greater again. This is the way in which this has developed itself in my experimental work. I understand that Tomes is now repeating this work. I expect that he will practically substantiate these results, although not precisely, for no two sets of teeth taken from among one hundred persons will give the same results. The difference in density of the teeth of the same person is almost as great as the differences in the teeth of one hundred persons.

The influence of the pulp has been spoken of. Of course, the moment the pulp is dead the increase of density stops. This increase of density occurring in old age or in persons past middle age shows very plainly that the teeth require nutrition throughout life. In teeth that are worn down the pulp has receded, and the enamel has receded, and when it is worn away the strength of the dentine is impaired in proportion to the recession of the pulp. That wearing away of the teeth that we have come to regard as normal produces an abnormal condition of the tissues of the dentine. That tissue of the dentine has lost its vitality, fluids are admitted to the dentinal tubes, and that dentinal tissue becomes impaired and its strength is gradually lost in perfectly sound teeth. This is shown very clearly by experiments. Wherever we have a tooth that has lost its pulp and the vitality of the dentine is gone, and that tooth begins to show a discoloration, there we find that the strength of the dentine is impaired. When we come to test its strength, with the dynamometer, we find that the strength is impaired. We find a peculiar disposition of the enamel to chip off from the dentine. It is much more liable to be broken away, as my friend, Dr. Taft, has said. In the tooth that has its pulp and its proper nutrition, this parting from the dentine is not observed. This difference became very marked in this class of experimental work, all of which goes to show the value of the dental pulp, not

simply in youth but throughout life. The breaking away that Professor Taft has spoken of and the causes of that breaking away seem to be well shown in this class of experimentation. The pulp is important, not only in youth but continually thereafter. As a person grows older its importance may be diminished, but it is still important, and it seems to me, after going over this class of experimentation, that if we can do anything to prevent the wearing down of the tooth, it becomes our duty to do so. Often we can build up here and there with the platinum gold that Dr. McKellops spoke of. We can build up the tooth with the harder material, thoroughly annealed and malleted, and we can make it much harder than hammered cast gold. We can make it stronger than the gold that we put through our rolling-mills and make into plates. It will bear more stress if we will give proper attention to the manipulation and the building of those fillings.

I do not know whether it is exactly under the subject of discussion, but I want to say a word about pulpless teeth, the effects upon the dentine of exposure of the pulp-chambers to the fluids of the mouth. If I do not follow it any further, I want to say that whenever we admit the fluids of the mouth to a pulp-chamber for twenty-four hours, we have injured that tooth for all time. It is now well known that when the pulp must be removed, if it be removed by the direct operation by the dentist, and the fluids of the mouth are not admitted at all, that the color of that tooth is maintained, if the filling be a perfect one. It is far more important that a filling be perfect in a pulpless tooth than in a tooth that has a living pulp. The deterioration and weakening of the dentine seems to be in some way connected with the admission of the fluids of the mouth to that dentine. The discoloration is dependent upon that, and wherever we get this discoloration I have found the weakened condition of the tissues of that organ. Wherever the tooth is bright, we find its strength good.

It is a mistake to suppose that light-colored teeth are weak teeth. They are not ; they are the strongest. Whenever we find them deteriorating in color, we find them deteriorating in strength, and the management that retains the color seems to retain the strength, whether it be in teeth that are wearing down or in pulpless teeth. That very admission of the fluids of the mouth to the tooth is the cause of the discoloration and the weakening of the tooth. During treatment, the greatest care should be exercised not only to prevent alveolar abscess afterwards, but to preserve the strength of the tissues of the tooth as well.

Dr. Taft.—Dr. Black says that when the tooth receives the fluids of the mouth, it changes color and is weakened; but while it retains its color, he says it retains its strength. I do not think he intended to say that it retains the strength it had while the pulp lived, or the strength it would have had if the pulp had remained alive in that tooth. There is a deterioration in every tooth when the pulp is destroyed, but far more marked in the cases mentioned than in those that retain their color. There is a deterioration in every tooth after the destruction of the pulp.

Dr. Peirce.—All papers that are presented to the Association that cannot be read here will be read by title and go into the hands of the Publication Committee.

Dr. Crouse.—This Association should adopt a different plan in regard to the section work, so that a section that takes two days shall not be crowded into one. It is not necessary for every section to report at each meeting. It ought to take two or three years for a section to prepare for a meeting of this Association, and two sections ought to take up the entire meeting. The report on Operative Dentistry that we are on now ought to occupy at least two days of the session. It is not necessary to hurry them through. They will improve by being kept until another year.

Dr. Stephan (of Cleveland).—The discussions of these papers have generally been short during the time I have been coming to these meetings. I come here to learn, and a discussion such as we have just had repays me for all my trouble in coming, and I hope we will have more of this, and not a crowding out of these papers.

Dr. Crouse.—I would move that all reports of the sections that we do not reach now shall not be read by title, but pass over until next year, and be taken up as part of our next year's work.

Dr. Patterson.—I am not in favor of that motion. It seems to me that it is not wise, and I think it should be voted down. If we have papers prepared, and they go over for a year, their value will be entirely lost. When one has spent a great deal of time in getting up a paper on a particular subject, the reputation which he has gained may be taken by some one else before the next year, and the work he has done counts for naught. If section work is done in the sections, if papers are read and passed upon by the sections themselves, and not slipped in, they ought to be published whether they are read or not.

Dr. Crouse.—Do you think it necessary to have all the sections report every year?

Dr. Patterson.—I have just said, let it go in the published report

if the section passed on it. I do not want the matter crowded in, but I have not been in favor of adjourning when we were in the midst of an important discussion.

Dr. Crouse's motion laid on the table.

Adjourned.

(To be continued.)

HARVARD ODONTOLOGICAL SOCIETY.

The regular monthly meeting of this Society was held March 28, 1895, at Young's Hotel, President Dr. James Shepherd in the chair.

After the usual business meeting, Dr. Julius G. W. Werner read a paper upon the "Treatment of Decay in Approximate Surfaces of Bicuspids and Molars."

(For Dr. Werner's paper, see Volume XVI., page 747.)

DISCUSSION.

Dr. Stanley.—I would like to ask Dr. Werner if his principal objection to the use of amalgam is the effect of discolored teeth?

Dr. Werner.—My principal objections are the discoloration to tooth-substance, the homœopathic objection, the want of edge-strength, and arresting decay no better than gold.

Dr. Stanley.—Does Dr. Werner contend that gold has a more preservative effect on the dentine of a tooth than amalgam?

Dr. Werner.—I think it has fully as much, is nicer, cleaner, is a pure metal, hence more desirable than an alloy or a mixture of silver, tin, and mercury.

Dr. Stanley.—Then why do you recommend tin in some instances?

Dr. Werner.—Because we get an oxidation of the tin, a benefit, with no discoloration of tooth-substance, nor presence of mercury, as we have in amalgam.

Dr. Stanley.—The amalgam that I use has a good percentage of tin in it. As I understand it, gold exerts only a mechanical effect on a tooth. In a combination filling, with amalgam at the cervical wall, the result will be rather better than from amalgam alone.

Dr. Werner.—What makes you think that?

Dr. Stanley.—The gold will remove all excess of mercury, and give it a better edge-strength.

Dr. Werner.—Do your patients prefer amalgam?

Dr. Stanley.—They prefer what I advocate. I do not advocate any one filling-material over another, but the best material must be used for the case according to my judgment, and that is what my patients accept.

Dr. Werner.—Don't you think your judgment is often dictated by the amount of time, money, skill, and labor connected with a case where you use amalgam?

Dr. Stanley.—I look to the result to be attained first, and then use what I think is going to serve my purpose best. It isn't necessary to fill the cavity four-fifths with amalgam. It is difficult to pack gold under the gum, and in a great many cases a plastic filling gives much more satisfactory results. These contour fillings for such cases are ideal on paper, but in a few years I think they will fail quicker than a combination with amalgam instead of gold alone.

Dr. Werner.—Did you ever fill to contour a bicuspid with gold?

Dr. Stanley.—You must be joking, doctor; certainly I have. I have been in practice for ten years.

Dr. Werner.—And has it kept it from decay?

Dr. Stanley.—Yes.

Dr. Werner.—Are you not satisfied with that?

Dr. Stanley.—Yes, but I claim I have progressed from that. From all gold I have come to use combination fillings which, in their proper places, are superior and more easily and expeditiously adapted.

Dr. Briggs.—I heartily endorse what the writer has said, so far as he goes. His eye seemed to fall on me while reading the paper, —possibly for inspiration and encouragement, and possibly because I have advocated soft fillings. I want to go on record distinctly that I have never advocated soft fillings except as treatments, and I do think as treatments they fill a very large and important place. I can imagine a great many cases where it would not be wise or right to put in the contour all-gold filling until the tooth had been treated to a certain proper pitch to allow of such a thing. It does not seem to me that the material to be used is the important principle; of course that comes into play, and experience teaches which material is best adapted for certain circumstances; but I believe the fundamental principle is the restoration of contour, and I have never advocated anything else since the very early days. I would like you to show me a man who has been in practice fifteen or twenty years who has not done a little separating, but I long since saw the folly of that. Dr. Werner surely would not take the bi-

cuspid of a young patient, fourteen or fifteen years old, where in all possibility and probability nature has not completed her work, and put it through such a course of treatment as is necessary in restoring full contour with gold. Of course, that brings it back simply to discussion of judgment again, but the principle of ultimately restoring contour I fully and firmly believe in. Soft fillings I regard as treatments to reach an end.

Dr. Ainsworth.—It is quite generally known that the method which has been described here this evening is one which I have been thoroughly converted to for a number of years, and it seems to me, as Dr. Werner has stated in his paper, that one needs to have but a single lesson in his own mouth to decide that contour work is much more acceptable and agreeable than separations. The last speaker referred to a method of separating. I think most of us have tried it, and I hope have come to the conclusion that contour is the best.

Disagreement in the discussion of cases, I am led to believe, comes about largely by the difference in conception of that case. It is very difficult to intelligently discuss any particular case unless you have it directly before you and everybody understands it alike. If one has a case that is free from the gum, and another has one that is under the gum, the treatment becomes very different, and possibly both men would agree if they understood the case alike.

I have used a steel matrix for a long time in the filling of approximal surfaces in bicuspids and molars, using soft gold at the cervical wall,—sometimes absolutely non-cohesive gold. I use mainly, however, soft gold as it comes to us in cylinders; it can be made slightly cohesive by annealing. I have in a few cases used tin and gold at the cervical wall, but I do not recognize great advantage in tin and gold, excepting in very poor teeth. There are cases where I would use amalgam at the cervical wall, though I have never practised that method much. By the aid of the matrix I find it a comparatively simple matter to fill cavities of this kind, using a large percentage of soft gold about the walls and on the approximal surface, and what more satisfactory material is there at present in use? Who of us that have been in practice twenty years have not taken out non-cohesive gold fillings which have been in many years, and, although they were very ill-looking fillings, have been surprised to find how nicely the dentine has been preserved. The edges of the cavity have been rough and uneven, and the filling unsightly, and we have been prompted to take it

out, perhaps, because of its unsightliness, but we have found that soft gold has preserved the tooth, and in strong teeth I do not know what better material we can use.

One who is not familiar with this method may perhaps imagine that it is a very tedious or laborious operation to fill a good-sized approximal cavity in a bicuspid or molar. It *is* more trying than with a plastic, but the result is so much superior, so much more comfortable to the patient, that it would seem to me to very much outweigh the time and labor saved by putting in a plastic, which must of necessity be temporary. Really, the greater part of that filling can be placed in without the mallet and in rather large pieces after you commence, and I am surprised when I compare the time that it takes me now to place in a large compound bicuspid or molar filling to what it did when I first commenced. If I could have had the knowledge regarding this method at that time that I have to-day, it would have saved me a great many hours of hard work and my patients much pain.

In regard to the matter of platinum and gold on the surface, I rarely use it, excepting where I am building down teeth that come to much wear. In cases where the molar teeth are gone, and the front teeth have to do double service, all the mastication being done by the front teeth, the gold will wear very rapidly. In those cases platinum and gold for the surface is very much more durable than pure gold. I have used platinum-gold in approximate surfaces in front teeth, but do not now. It is a little better color perhaps, but where you get two approximal cavities coming together, the reflection is such as to give a dark appearance,—more than the pure gold,—so that my use of platinum and gold is very limited. I do not see any objection to using tin and gold if it is where it does not show, even in the very strongest teeth.

Dr. Werner.—Wouldn't you prefer it to amalgam?

Dr. Ainsworth.—I should prefer it in the majority of cases. There is a danger of our becoming one-sided in these matters, and becoming enthusiasts on one subject to the exclusion of others. I believe in the use of all filling-materials, and that each in its place will best serve the end desired. Each one must judge for himself what material will give the best results in the particular case presented. What we learn of the character of the teeth in the preparation of the cavity often influences us in the choice of the material. I sometimes commence a case intending to fill with gold, and finally use gutta-percha. There are places where I would use gutta-percha as the best thing possible, and some instances in

which I would use copper amalgam, and in still others cement; but, as a rule in practice, excepting where teeth are exceedingly sensitive and of poor quality, I have never been able to feel that I was doing my duty to a patient in recommending half a dozen or more gutta-percha or cement fillings where one gold filling would take the place.

I may have erred in the past (I suppose we all have) in my enthusiasm to do the best thing for the tooth; I have saved the tooth by a too laborious and painful operation, and lost the patient. Business principles would not perhaps justify a man in pursuing that policy. Cases have come into my hands from other dentists that were in pretty bad condition, but I have learned (and I hope that those who have had occasion to see my work have also learned) that we are not to judge a brother dentist by a single failure. It may have been the dentist's fault, but it is more probable that it is the patient's. We have to do the best we can under the circumstances. Circumstances enter more largely into perfect work than almost anything else. We are not all possessed of the same degree of skill, to be sure, nor are we possessed of the same class of patients; some of us have poor patients, and *we* may appreciate the extent to which they would be benefited by having several beautiful full-contour gold fillings in bicuspids and molars; but the patient may not appreciate the value of such work, and sometimes when they do appreciate it, it may not be possible for them to take on the expense of having the teeth thoroughly and permanently repaired. Under those circumstances we must do the best we can, and must admit that amalgam comes in and renders valuable service. But I would make the point that to restore to full contour these surfaces with amalgam would many times take more time than to do so with gold. Let us suppose that we have two bicuspids, largely decayed approximately. We wish to restore them to full contour and have them stand in relation to each other as nature designed. If filled with amalgam, it would be necessary to separate the teeth and fill one of them, and wait until the next day to polish that to the contour of the tooth; then go on with the separation, more than would be necessary for a gold filling, and fill the other side; let that rest until the next day, and then polish that. Then we might get the natural condition of those teeth, whereas if we were to fill those cavities with gold, we could adjust the matrix, and fill one and finish it, and that would be out of the way; at the next sitting reverse the matrix, and fill the other and finish that, and with less separation than would be

required for the amalgam fillings, because we could use the separator and force the teeth apart sufficiently to do the work, with no fear of a plastic condition of the contour interfering with the shape. So it would seem to me in such cases quite as much work to fill with amalgam as with gold, and it would not seem worth near as much. I think I should have spent quite as much time in creating the desired condition with amalgam as with gold, so that the cost would be nearly, if not quite, as much to put in the amalgam filling. The difference in the material, of course, amounts to nothing.

Dr. Werner.—There is one paragraph I wish particularly to call Dr. Briggs's attention to,—namely, "where good judgment and favorable conditions dictate a permanent in distinction from a temporary or plastic filling." That covers, I think, all the questions of judgment that can be brought up. I am not to suppose the case in question and good judgment as both being absent. I have no doubt you use good judgment in your practice, and you must not get the idea that I do not in mine. I believe firmly in the matrix, full contour, gold, with gold and tin at the cervix, and not in amalgam.

Dr. Stanley.—Do you use amalgam at all in your practice?

Dr. Werner.—Very little.

Dr. Stanley.—Supposing we take the posterior surface of a second molar, with the wisdom-tooth in position; it is decayed well up under the gum, and the tooth will stand a metal filling,—how do you fill it?

Dr. Werner.—I would fill such posterior surface in a second molar with gold, using at the cervical wall gold and tin, restore it with the use of the matrix to full contour, do it in a comparatively short time, with comparative comfort to the patient.

Dr. Stanley.—Of course, when a man has a theory, or hobby, or pet method, he becomes in a greater or less degree master of the technique that it requires to execute it, and I can understand how Dr. Werner, from his constant practice, might put in such a large contour filling, and build it up from the cervical wall with gold, in less time perhaps than the operator who does not believe in filling such cavities with gold alone. But I certainly could do it a great deal easier for myself and my patient, and I should have more confidence in the service of the filling, if it had amalgam at the cervical wall.

Dr. Werner.—I think I am doing a better service for my patients when I restore an approximate surface to full contour with gold,

with gold and tin at the cervix, than if I used amalgam, gutta-percha, or cement, both as to arresting decay and general desirability.

Dr. Stanley.—I should not for a moment think of putting cement in such a place, but amalgam for that place would be a permanent filling.

I believe most thoroughly in the use of the matrix, and I use it sometimes even when I am putting in gutta-percha or cement fillings for the preparation of approximal cavities in bicuspid teeth where I do not think they are ready for a gold filling. The success of those fillings, I believe, largely depends on the preparation of the cavity. The cavity should be just as thoroughly prepared for one material as another. The standard alloy hardens very quickly, and by the time you have finished the filling with gold, the amalgam has become so hard that you can polish with a strip without affecting the gold, and you have your contour fillings just the same.

Dr. Werner.—How much time do you spend on a surface of that kind to fill with amalgam?

Dr. Stanley.—I could not say,—twenty minutes to half an hour, or longer; it depends on the case.

Dr. Werner.—How much time afterwards in finishing?

Dr. Stanley.—That also depends on the case. I finish it to the contour of the tooth. The matrix holds it there until it becomes hardened.

Dr. Werner.—What becomes of the contour after you remove the matrix?

Dr. Stanley.—It stays there.

Dr. Werner.—You can't finish the amalgam filling at that sitting?

Dr. Stanley.—Oh, yes, you can. A thin narrow strip will do it.

President Shepherd.—I believe there is in the room a gentleman who has in his mouth an example of some of the work we have heard about to-night. Will the gentleman tell us something about it?

Dr. Cheney.—I don't know that I can say anything further than that they have been perfectly satisfactory and comfortable. I should be glad to show them to any one who cares to see them.

Dr. Ainsworth.—I might explain that those fillings were put in at a clinic before the Vermont Society under this method five or six years ago, and I did not feel very sanguine of the results. One of them especially was very difficult, one that I do not think a person has a license to clinic with and expect it to speak well for the

method. It was in a superior bicuspid, well under the gum, with the nerve exposed, and I was in doubt at that time whether we should have trouble. The conditions were such that it was impossible to get the rubber on without putting on the matrix first. I should like to hear if that tooth has given any trouble since.

Dr. Cheney.—I am glad to state that the root has never given me any trouble since the filling was put in. If you will remember, the pulp was first covered with varnish and cement.

Dr. Ainsworth.—I remember there was something placed in to protect the pulp. It was thoroughly exposed, and I felt it was treading on delicate ground to fill such a tooth without removing the pulp.

Dr. Cheney.—I have been very much interested in the paper of Dr. Werner, and am a thorough believer in contour work to protect the gingival margin. I am also quite a believer in the combination work. I believe a great many times, by using amalgam at the cervical wall, a very difficult case can be handled easier than with gold entire. In placing in those approximal fillings I have never used a matrix, but I have used soft gold at the cervical wall, and burnished it over the edge as well as I could, and then come down with slightly cohesive gold. I have seen some sore gums from not having the filling properly contoured,—in fact, I had one or two cases in my own mouth which gave me considerable trouble from food working up there.

Dr. Chandler.—Three or four years ago I was of the opinion that in a great many cases an amalgam filling was as good as a gold filling,—I mean as regards restoring contour and comfort to the patient; but since I have seen Dr. Werner's work I am very strongly in favor of the use of gold. It seems strange to me now that an operator should think of placing amalgam into those approximal cavities, leaving the edges of the cavities perfectly straight up and down, affording an opportunity for food to collect, and the edges of the cavity to become broken down to expose the dentine, when a full contour gold filling will not only protect the edges of the cavity and prevent the progress of decay, but be a comfort to the patient.

President Shepherd.—Will Dr. Werner tell us why he prefers hand-pressure to the pressure of the mallet in connection with soft gold?

Dr. Werner.—Because you condense the soft gold in a manner more comfortable to the patient. Hand-pressure is more thoroughly adapted to the condensation of the gold than the quick,

hammering blow of a mallet, and with the assistance of the matrix the result is everything that could be desired.

President Shepherd.—Is it as solid as a hammered gold filling?

Dr. Werner.—I don't think that the hammered solidity is an advantage to a tooth; I think it is a decided disadvantage. I would, of course, hammer the very last portion of the gold, the portion that comes to the occluding surface, but nearly eight-tenths of the filling I would do with hand-pressure. When you learn how to use the matrix skilfully, the cervical wall portion that many now fill with amalgam they will fill with gold and like it better. I am not a believer in the Hahnemannian theory, but I do not like a filling of which mercury is an ingredient. There is a member here to-night who a year ago spoke of a case where he removed thirty-five amalgam fillings and replaced them with gutta-percha and cement. I have never in all my experience, which, including pupilage, covers nearly twenty-three years, seen a case where good judgment would seem to dictate the insertion of thirty-five gutta-percha fillings in one mouth. My professional sense of duty dictates to me, if the patient is willing and the tooth is strong enough, to put in the best and make the most lasting filling I can. Look at this typical case here, where the patient became absolutely disgusted with the imbecility of her previous dentist, who filled that approximate bicuspid surface with cement every six months, or year and a half at the longest. It was never thoroughly excavated. I think she has paid more for those oft-repeated cement fillings than a thorough full-contour matrix gold filling would have cost, and she has had none of the comfort and the protection of the gum that she would have had with a contour gold filling.

Dr. Stanley.—In what form do you use your gold?

Dr. Werner.—I use Williams's soft burnished gold cylinders. It is very pliable and gives a beautiful finish. It can be thoroughly condensed, and to me it is the most satisfactory for use with the matrix. I do not like a gold that is absolutely non-cohesive.

President Shepherd.—Combination fillings have been referred to several times this evening. Perhaps Dr. Clapp will say a few words to us on that subject.

Dr. Clapp.—I don't think it is necessary for me to say anything about combination fillings. You know how heartily I believe in them, and, as I have often said, it seems to me that I could not practise dentistry without them.

In regard to the paper, I have nothing to say except to offer my thanks for it, especially for that part where Dr. Werner insists

on separating the teeth properly, and getting at them so that contour fillings can be thoroughly and perfectly adapted to the cavity. In my opinion that is the cause of the failure of the majority of such fillings, in not giving time for preparation. You cannot make a proper filling in an improperly prepared place, and I freely admit that my failures come oftener from the lack of time to separate the teeth so that the proper contour fillings may be placed in the cavities than from any other cause. It seems strange that to-day anything but a contour filling in approximal cavities should be thought of or be tolerated, and, conversely, I believe we are gaining in our knowledge of what should be done, and in our desire to do it, and in our skill to do it; and also I believe we are gaining in the appreciation of our work by our patients, and that is very gratifying. There is no limit to be placed upon the value of teeth to the person who owns them, and it is a fault that we should all strive to overcome, this hurrying matters too much.

I heartily endorse the paper so far as its advocacy of contour work is concerned. So far as selecting the material enters into the case, each operator must decide for himself upon the circumstances presented. I can do better work in some instances with amalgam combined with gold than with gold alone. I do not like to use it, but I am compelled to because it is the best thing that I have in many instances for the case at hand.

Dr. Ainsworth.—I believed in contour work and tried to practise it from the very start; but formerly it was a long, laborious operation, commencing with cohesive gold at the cervical wall and using cohesive gold all through. Under such large fillings I now and again got caught with a dying pulp, caused by the conductibility of the filling. Under this method, where perhaps the first two-thirds of the filling is made of non-cohesive gold, I have no trouble of that kind.

Those who are not familiar with it will be surprised at the simplicity of the filling of a posterior approximal cavity with the matrix. It is easier to fill a posterior approximal cavity with the matrix than an anterior cavity without the matrix. Then the simplicity with which such a filling is finished, providing the matrix has been adjusted with the right tension, and that may need a word of explanation. Do not understand that the matrix is put on rigidly. It is placed on in such a manner that when the filling is put in it will swell out a little, and if your matrix is properly formed you will have a uniform fulness to burnish down, and almost the entire finishing of the approximal surface can be done by the burnisher.

When I was speaking before I did not think to refer to Dr. Rogers's electric case, where the battery was formed from the two metals. I cannot but believe that there is something in it. I have been in the habit of filling children's teeth with cement and gutta-percha, and filling them over and over again; but lately I have got in the way of using slow-setting cement, and then veneering with amalgam on the surface. While inserting a filling in this manner in the mouth of a young lady the other day, a spark of electricity was liberated; in fact, it occurred several times within a few moments, causing a sensation similar to that of a galvanic battery, only in a very slight degree. She had gold in her mouth, and the amalgam contained tin, silver, gold, and copper. The percentage of copper, of course, was very small.

President Shepherd.—If no other gentleman cares to speak on this subject, I will ask Dr. Werner if he wishes to say anything in closing.

Dr. Werner.—I have not said half that I could say on this subject, but may have said so much as to have tired some here present. I spoke but little in my short paper on the preparation of cavities,—almost nothing,—but that is quite an item, and I am glad that Dr. Clapp sees the vital point. He has the truth of the matter,—your contour and your preparation of cavity is the secret of success, and that can only be secured with the matrix.

Dr. Stanley.—It seems to me that the preparation of the cavity is independent of the matrix.

Dr. Werner.—In all of the cases that I have presented to-night I could not have excavated and filled with gold without the use of the matrix. The excavation and preparation of the cavity many times takes one a good half of the whole length of time of the operation. I have no patience with the unprofessional plastering and hurrying method that is sometimes practised.

If I should tell you that since the first day of January until to-day—and I have operated every day in the week except Saturday afternoons and Sundays—I have used amalgam perhaps six or eight times, you will be surprised; you will hardly believe it. Another operator will use it five or six times in one sitting, and do that same thing six or eight times in his daily work. We must make allowance for different practices, to be sure, but also for an immense difference in the willingness, the skill, and the ability of operators to perform certain kinds of operations.

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ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

A MEETING of the Odontological Society of Pennsylvania was held Saturday, November 9, 1895, at 1415 Walnut Street, Philadelphia.

The paper of the evening, "The Heroic in Dental Operation, as contrasted with Conservatism," was read by Dr. Kratzer.

(For Dr. Kratzer's paper, see Volume XVI., page 744.)

DISCUSSION.

Dr. Peirce.—I think Dr. Kratzer strikes the key note when he says that we ought to work for our patients' benefit rather than our own glory. I remember some few years ago a lady coming from a neighboring city. She told me she had paid six hundred dollars for having her teeth contoured, and she had not had a comfortable day since, although she had tolerated the work for several years. It was beautifully done, but on frail teeth with roots predisposed to irritation, and while there were no suppurative processes, yet the gums were tender. There were two bicuspids that especially troubled her, and she requested some relief. I took out the fillings and cleansed the devitalized roots. The teeth had been wedged apart previously to contouring, and had not been allowed to return to their normal position. The fillings extended over the faces of the roots so that there was constant impingement of the crowns, one upon the other. She said she did not mind the appearance of gold, so the roots were supplied with gold caps, and these she is wearing comfortably to-day.

It is a mistake to keep patients in the chair four, five, or six hours, while malleting a gold filling, when we could make a better operation by trimming off the tooth properly and adjusting a collar and a porcelain crown.

One of my patients said, I don't see any necessity for having my teeth fixed, if I am to suffer a penalty equal to death, and she was correct in this opinion. There are dentists who delight in large contour fillings, which so exhaust the patients that they oftentimes are in bed for days.

Where we have an approximal surface of a tooth to be restored, it should be contoured carefully. But where half or two-thirds of the crown is gone it is unjust to the patient to build it up piece by piece.

Dr. Faught.—The day for the heroic in dentistry is passed

There are times when it may be good to indulge in these protracted operations, but when we do that kind of work it is only as a necessity. The more we shape our practice to the conservation of the teeth by the easier and less protracted operations, the better it will be for our patients and the better for us individually.

My own practice is made up to some extent of nervous people. Many times I have seen an opportunity for building up large fillings, but I have adopted other methods.

Particularly do I believe the conservative method of the greatest value where we have to deal with children. I remember a case in my practice where I had a family of three or four boys over a period of three years, and just this winter am I successful in placing all their mouths in perfect condition, but it was only by doing conservative work while they were young that I was able at the proper time to replace plastics with gold.

I will recite a case that left a profound impression on me. It was with a family of three children,—nervous, growing girls. These children came to me, and by the use of gutta-percha against the frail enamel walls I was able to make them comfortable, and to bring their teeth into the condition where later on I would be able to execute more lasting and permanent gold work.

One year, just as the summer months were approaching, I failed to see one daughter. She was away at boarding-school. The mother said she thought she would have to excuse her from seeing me until after vacation. I warned her that there was a cavity that ought to be attended to, and that in a few weeks I would be closing the office and going away on my summer trip. The patient did not come in. During the time I was away the father took this daughter to his dentist, who not only filled this cavity, but suggested the removal of the gutta-percha fillings, and also suggested that there had been a good deal of very poor dentistry executed there. It was summer time, when our visits are not as numerous as they might be, and he ruthlessly cut away the enamel. The teeth were so sensitive and tender that he was obliged to etherize her in order to excavate the cavities and prepare for the insertion of the filling. She spent two or three hours in the chair each sitting, and in going out on one occasion fainted at the corner of the street.

He not only did that, but went further and suggested that perhaps the other daughters' mouths had been under the care of the same gentleman and were in the same condition. The father, very much exercised, took the other children there and had them

treated in the same way. The result was that not one day elapsed that those children were not in agony; every mouthful of hot or cold food in the oral cavity brought tortures and pangs, and they never had one moment of peace from the day they sat in the chair until in the fall, when they came to me again, brought back by the mother, who desired that I should take away the heroic operations and replace them with similar gutta-percha fillings to those that were there before. I could not do it, of course; the enamel walls had been cut away to the very edge; but I did the best I could. The result was that the pulps died, and the mouths now are wrecks in comparison with what they might have been had conservative dentistry been allowed full sway.

There is another thing that I have been very much interested in. There is a little preparation in the market to-day under the name of Power's antiseptic balsam, and I have been giving it a trial, with much satisfaction. It is used by touching it to the cervical edge of the cavity, without cutting retaining pits. It is easy to attach the first piece of gold to the walls, and thus excellent and desirable gold fillings can be made without subjecting the patient to the pain or the detriment of cutting away the cervical edge, and leaving the enamel without dentine back of it. Care is to be exercised to place it well back within the cavity.

Dr. Jamison.—I cannot say that I entirely agree with the former speaker. I have not been a great advocate of plastics; I rather incline to the gold theory where it can be properly used. As we get older we become more conservative. The majority of the young men who come from our colleges are apt to be heroic; very apt to delight in large gold fillings and contours, and I think, in a measure, it is good that they do, if the patients are not made uncomfortable. I am not an extremist. The key to the whole subject is judgment; this should be exercised, and that covers the whole ground.

Dr. Boice.—While the paper was being read my mind reverted to the case of two sisters who did not dare to come to the office alone. They had in previous operations required the attention of a physician after they had been to the dentist, but after I had had charge of them for about a year they no longer feared to come alone.

I met a gentleman on Chestnut Street one day, and he said, "By the way, won't you make an appoinment for my wife? She has lost another of her fifty dollar fillings." I did so and filled the cavity in twenty minutes with amalgam. The original filling had

required seven hours and she was in her room for one week. The gold filling lasted four years and the amalgam has been there for seven.

The gentleman who put the fillings in, I think I can say, has been one of the experts in packing gold in the city of Philadelphia. He believed in the heroic treatment. He said he never filled with amalgam; he despised gutta-percha.

I have long ago abandoned the idea that it was my duty to punish patients by keeping them in the chair three, four, or five hours to build up an old root with gold when I could put a crown upon it that would be more serviceable.

The essayist suggested something about sea-sand and a cantilever bridge. The mass of crown- and bridge-work has been appalling. To-day I examined a crown on a bicuspid, the band of which was much too large, while it extended an eighth of an inch under the gum all around. That is indeed heroic treatment. In crown- and bridge-work to-day, this illustration is not an exception, but one of the average operations.

Dr. Warren.—I agree with Dr. Jamison that judgment is essential. As far as plastics and gold crowns are concerned, both are to be used. All of us see crowns and bridges which should never have been placed in the mouth; but, at the same time, it is not advisable for us to speak of bridge-work and crown-work so as to make the impression that it is all bad. There are instances where a crown is the only means of saving a tooth. There are times when we find good firm roots where bridges can be placed to advantage. I have put fourteen teeth on a gold bridge (or band), anchored to two molars and two cuspids, and I have known such bridges to give excellent results. It is not advisable, as a rule, to go to extremes in any line of work, but as far as crown- and bridge-work is concerned, if it is properly done, much permanent good will ensue to the patient. As Dr. Jamison said, judgment is the all-important factor.

Dr. Broomell.—I reverted in my mind to the beginning of my practice when Dr. Kratzer spoke of Dr. Webb. And while he was certainly an extremist as to the matter of gold work, and while his fillings were excellent, there is no question but that he overdid the matter. There seemed to be what might be termed a filling craze, and everything must be filled with gold. I remember a case I had myself while at college. It was a bicuspid tooth, upon which I placed the rubber dam at nine o'clock in the morning and kept it on until four in the afternoon. When the work was finished, it

was a very satisfactory operation. But that can now all be done away with by a perfect-fitting gold crown.

The essayist spoke of open-faced gold caps as being preferable in many cases, or probably in all cases, to the solid crown. I don't see how it is feasible to allow edges to remain unprotected which must continue intact if the secretions are not to disintegrate the cement underneath. I should think, under these conditions, it would only be a question of time when the crown would have to be removed.

Dr. Kratzer.—As to the remarks of Dr. Broomell in respect to open-faced crowns, I maintain that when it becomes necessary to remove them on account of leakage, we can still incise the root and put on a Richmond crown, having put off the final operation and gained valuable time.

Dr. Jamison.—I might say that I do not agree with Dr. Broomell as to open-faced crowns. I can cite a case where they gave me much satisfaction. A patient came to me with two bicuspids where the inner cusps had been broken; the teeth were still vital. By making an open-faced gold crown I was able to save those two teeth by showing very little gold at the cutting-edges, and the pulps were saved.

Dr. Kratzer made a good point when he said that, though an open-faced crown only lasted five or ten years, if you can save the superstructure five or ten years you are certainly in a good position to save the root for a number of years.

Dr. Tees.—My experience with open-faced crowns, as far as bridge-work is concerned, has been the same as Dr. Warren's. I have seen many put on, and with very good results, but if they are improperly constructed, they are worse than nothing.

JOSEPH HEAD, M.D., D.D.S.,
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Editorial.

DR. G. V. BLACK'S INVESTIGATIONS OF THE HUMAN TEETH.

In the judgment of the writer, any attempt to express an opinion for or against the work of any one where this has been based on actual investigation would be not only valueless but the height of folly. Dentistry has had entirely too much of this talk for talk's sake, and it has therefore been with some degree of satisfaction that we have observed that, with but one exception, the entire dental world has been silent in regard to Dr. Black's work. It is a reflection on the intelligence of dentists to have this charge made by a contemporary: "Dr. Black's paper was published in May last. Up to this writing there has been no response. Are we all paralyzed?" We prefer to think that intelligent dentists, having found the conclusions at variance with experience, have decided to wait before giving expression to their thoughts until some one with time, means, and practical knowledge could repeat these experiments, and confirm or reject them.

While this view is true, it still remains the duty of the faithful observer to note apparent errors of investigation here or elsewhere.

Viewed in any light, the labor of this very able worker in untrodden fields must be held to be most painstaking and thorough, and quite equal to any that has preceded it. This is Dr. Black's due, and while it is impossible to concede results entirely satisfactory, the fact remains that he has led the way for others to follow.

The difficulties attending an investigation of this kind are innumerable, and, it is feared, will ever remain insurmountable. The controversary between "soft teeth" and "dense teeth" has not been settled by these investigations; indeed, it is probable that this will continue with increased intensity.

While desirous of giving Dr. Black due credit for all that he has done, as represented in the series of tables in the May number of the *Dental Cosmos*, it must be clear to any one dispassionately reviewing his labors that in the first paper is demonstrated but one thing, and that is that dentine becomes more dense by age.

Dr. Black states that his investigations are based on an effort to find "differences in the density, percentage of lime salts, strength, etc., occurring in human teeth, and to find what relation, if any, such differences may bear to dental caries and the diseases of the teeth." He says further, "I have chosen to confine the examination for density, proportion of water, lime salts, and organic matter to the dentine, as best expressing the character of the teeth as a whole."

For the collection of material he was forced to depend on the good offices of many professional friends. They were instructed "to place the teeth in an envelope just as they come from the mouth, write on the envelope the nativity, age, state of the general health, color of the hair, to class the teeth as bad, fair, or good as to occurrence and rapidity of caries, record the condition of the gums," etc.

There are two conditions that would seem to the general observer to invalidate the entire series of experiments. In the first place, dentine was taken as the tissue best calculated to represent density, or rather the character, of the entire tooth. The propriety of this selection may well be questioned in view of the fact that it is not dentine that is the resisting body against the attacks of caries, and that therefore inferences drawn from experiments upon this tissue must be largely fallacious; or, at least, they can have no force as antagonists to clinical observations.

The method adopted in collecting material seems faulty. It probably could never be otherwise; hence no reliance can be placed on conclusions. Teeth are "placed in an envelope" by persons, and marked "bad, fair, or good" as to progress of caries. These individuals may be thoroughly careful and competent to make the selection, but there is no evidence that such is the fact. It is in the experience of every intelligent observer that the "occurrence of caries" is no test as to the character of teeth. Those regarded in our own practice as the best in resisting power have melted with great rapidity by change of environment, and it is a notorious fact that the so-called dense teeth will decay by change of climate superinducing general physical disturbance. The difference between the great sensibility and poor character of the teeth of the Sclavonic people as compared with the Germans, closely contiguous, has demonstrated to many and to the writer that there is a wide difference in the structure of teeth not discoverable by the most exact instruments. The same diversity in structure is not confined to certain nationalities, but abounds, as a serious evil,

in this country of mixed inheritances. To attempt therefore to classify the average superior quality of teeth of the German, English, or Irish by the amount of dental caries existing among these races would be simply to exhibit ignorance of conditions. Dr. Black says in explanation of this that "there has been no selection whatever of teeth for this work, but such teeth as came into my hands I used, all of them that *were reasonably perfect at the gingival line*." Dr. Black assumes too much when he asserts that dentists have interpreted clinically teeth firm and clear in appearance, with neat gingivæ, clean interproximate spaces, and free from caries as "teeth that are well calcified," and teeth "coated with some form of glutinous deposit, perhaps, and rapidly progressive caries in numerous spots," as indicating "soft teeth or teeth that are poorly calcified."

It is difficult to conceive of a dentist so poorly skilled as to differentiate these important conditions upon such an absurd basis. That there is a marked difference in teeth, clinical observation has demonstrated from the earliest experiences in dentistry. That teeth become denser by age was known in the infancy of the profession, and while it is very satisfactory to have this demonstrated beyond cavil, the fact remains that nothing really new has been added to dental experience; indeed, it may be questioned whether these investigations have not tended to obscure knowledge already obtained and have made the path of the conscientious operator and teacher doubly difficult.

"There is no basis for the supposition that the teeth of children under the age of twelve *are too soft* to recieve metallic fillings." This is the dictum deduced from the prepared tables, and based on these it is doubtless correct, but what experienced operator ever founded his objection on teeth under twelve as being too soft if by that is meant lack of density. This term has, it is true, been used wrongly, and intended to convey the idea of immaturity. In that sense it is correct. The child of twelve and for many years thereafter has not teeth fitted to "receive metallic fillings," notwithstanding the tables presented or the high authority that produced them. These teeth are not fully developed, the tubes of the dentine are larger and consequently more readily affected by external irritants let these be from whatever source derived, whether thermal or medicinal. To deny this fact is to attack the very ground-work of dental histology, and we therefore do not for a moment suppose that Dr. Black means to be thus understood.

There is possibly very injurious results to follow from this strong

statement that "there is no basis for the supposition that some teeth are too soft or too poorly calcified to bear filling with gold, . . . since all are found to be abundantly strong." Advice such as this can only result in great harm, as it antagonizes the recognized observations of the entire dental profession for the past century. No intelligent practitioner can accept it, no matter what the authority may be that supports it, for, as stated, it is not true. If this is to be the teaching of the future, the students of the new era are certainly to be pitied, for a world of difficulty and many mortifying experiences await them. There must be a discrimination made as to character of teeth, and this should be based not on instrumental tests, but on more exact and reliable observation through daily experience with all sorts and conditions of men, women, and children.

If there be the same quantity of inorganic material in teeth of the same age, why, may it be queried, do we find some teeth in which caries progresses with extreme slowness, resulting in the transparent zone of Tomes, others with a character of dentine not much above chalk in texture, decaying with great rapidity? There is no explanation for this in the tables presented, nor is any attempted beyond the very unsatisfactory assertion that environments differ. This explanation cannot be accepted.

If Dr. Black had made selections instead of declining to make any distinction between teeth, and had secured material from a mouth recognized by those competent to decide as being of the purely soft variety, and submitted these to the test which he gave to those selected indiscriminately, results would have been obtained which would have gone very far towards settling this question. In the opinion of the writer, white teeth are by no means the poorest teeth, and this view is confirmed by Dr. Black, although how the experiments prove it is not clear, as all teeth become whiter as the drying out process continues. The impossibility of securing teeth of the character mentioned must remain a bar to exact observation, but until this be done we must decline to accept the conclusions of Dr. Black, except in a modified sense.

Bibliography.

Kronen und Brücken-Arbeiten. Ein Lehrbuch von Hans Riegner, Dr. Chir. Dent., Zahnarzt in Breslau. Erste Halfte, mit 266 Illustrationen. Verlag von Arthur Felix. Leipzig, 1895.

It is impossible to open the first half of this finely-illustrated and well-prepared work of Dr. Riegner on "Crowns" without a feeling that, whatever may be said of dentistry, as a whole, in its relation to American inventions, the proof is here that in crown-work, at least, other countries make but a poor showing in comparison.

The author has, with marked ability and industry, gathered all that has been written upon this subject, and that with the thoroughness peculiar to the German character, yet in this first part he has not been able to get beyond the American continent to any extent.

After giving a very clear description of the treatment and preparation of teeth and roots, the author begins the consideration of porcelain crowns. He regards Bonwill as one of the earliest advocates of the porcelain-crown system, and he therefore gives his crown the place of honor, the first to be described. While all credit is due to Dr. Bonwill, it should not be forgotten that crowns were made more than a half-century ago; but, while this is true, it does not materially alter the fact that the all porcelain crown of Bonwill had and still continues to have a marked place in dentistry.

From Bonwill he passes on to Howe, Gates, Foster, Genese, Stowell, Howland, Logan, Richmond, Brown, Weston, Meriam, Perry, Kirk, Townsend, Büttner, Richardson, Parr, Leech, Low, and Sachs. This is a fairly representative list, and exhibits an industrious search through the literature of this subject. It is questionable whether some have sufficient originality to warrant embalming in a work of this character.

The preparation of the roots for crowns is clearly demonstrated both in the text and by illustrations. The third part, on "Bridge-Work," will appear as a second volume. This seems to be a mistake, as these matters are so intimately related they should go together. It is possible that, as this is issued in paper cover, it may be supposed readers will have them bound together. This is not, however, the American habit.

The illustrations and general make up are worthy the house of Arthur Felix, the publications of which have a deserved reputation everywhere.

Annual of the Universal Medical Sciences. A Yearly Report of the Progress of the General Sanitary Sciences throughout the World. Edited by Charles E. Sajous, M.D., and Seventy Associate Editors, assisted by over two hundred Corresponding Editors, Collaborators, and Correspondents. Illustrated with Chromo-Lithographs, Engravings, and Maps. The F. A. Davis Company, Publishers, Philadelphia, New York, Chicago, London, 1895.

The editor of the Annual in his preface apologizes for the late appearance of these five volumes, in that " his best efforts to insure the 1895 series an early appearance were again frustrated by the tardy arrival of several papers." It is presumed that those who look forward with interest to this annual report will willingly excuse the editor, for there are few, it is imagined, but would prefer to wait to have the work presented in the satisfactory manner with which this collection is given

It is not surprising that this annual report should have had a remarkable success; indeed, it seems to the writer no one can claim to be fully abreast with the world's work in medicine without it, for it is not to be presumed that any one individual could possess the facilities for condensing this possessed by Dr. Sajous and his assistants.

As a work of reference in all branches of medicine it has no equal; in fact, it is believed no similar publication exists in which an attempt is made, and that successfully, to compass all branches of the healing art, excepting dentistry, in an annual series of volumes. This latter defect is neither the fault of the editor nor of the publishers, for every effort was made to have this subject included, but, unfortunately for this work and dental literature, the practice of this specialty is so exhausting as to preclude the possibility of an extended range of authorship. Since this publication was begun there has been a marked change in the division of work, with a decided increase in the number of those willing and able to write. It would, therefore, seem to be a favorable period for beginning a chapter or chapters on dental work.

The nearest approach to this specialty is the chapter on " Oral Surgery," ably conducted by Rudolph Mates, M.D., of New Orleans.

In the chapter on Anæsthetics, by Dudley Buxton, M.D., B.S. (Lond.), he devotes considerable space to " the discovery of anæs-

DR. THOMAS H. CHANDLER.

thesia," in which he quotes Dr. McManus and others, and summarizes the history fairly, but with special skill in avoiding committing himself to one side or the other in the prolonged controversy. He, however, concedes that Morton was the one to make the "first systematic attempt to employ ether in general surgery." This article, as a whole, is of special interest.

It would be a pleasure to follow the work of other editors and collaborators, but space will not permit.

No medical library, personal or public, can be complete without this series of volumes, and it is a pleasure to feel that both editors and publisher are receiving satisfactory returns in every way for the great labor bestowed in their preparation.

Obituary.

JOHN DE HAVEN WHITE, M.D., D.D.S.

The death of Dr. White took place at the Masonic Home, Philadelphia, December 25, 1895, in the eightieth year of his age.

It is with regret that the announcement of his decease came to us too late for an extended notice of his life-work in this number. This will appear in the February issue. He was a born leader of men, and occupied the most prominent position in dentistry in his day and generation.

RESOLUTIONS OF RESPECT TO THE MEMORY OF DR. THOMAS H. CHANDLER.

In the death of Thomas H. Chandler, A.M., D.M.D., the Harvard Odontological Society recognizes the loss to the dental profession of a man of rare attainments, and to the city of Boston of one of her most honored and respected citizens.

His early education was received in the public schools of this city, and upon the conclusion of his preparatory studies in the Boston Latin School, he entered Harvard College, whence he graduated as a Phi Beta Kappa man in the class of 1848.

As a mark of the esteem in which he was held by his classmates in college he was elected to the presidency of the Hasty Pudding Club and to the class secretaryship,—a life position.

His connection with the Harvard Dental School commenced upon its institution, in 1869, when he received the appointment of adjunct professor of mechanical dentistry; and upon the resignation of Dr. N. C. Keep, in 1872, he was promoted to a full professorship, with the degree of D.M.D., *honoris causa.*

Upon the death of Dr. Thomas B. Hitchcock, in 1874, Dr. Chandler was elected to fill the vacant deanship, a position which he held up to the time of his decease, and the duties of which, for twenty-one years, were discharged with great interest in and fidelity to the school.

Dr. Chandler was a man who was universally beloved and respected by both students and his associates upon the Faculty, and by all who came into professional contact with him.

His own great love and thirst for knowledge served only as a stimulus for imparting it to others, and in the truest and best sense of the word it can be said of him that he was pre-eminently a *teacher.*

The Harvard Odontological Society, bearing in mind therefore with grateful appreciation his long years of untiring devotion and service to the interests of the school, and the imprint upon the calling of dentistry which such a life as his must always leave behind it, desires to place upon record the following resolution:

Resolved, that in the death of Dr. Chandler, the members of this Society recognize individually that they have lost not only an esteemed brother dentist, but a warm personal friend.

That to his family we extend our most sincere and heart-felt sympathy.

That a page of our records be set aside in honor and affection to his memory.

Edwin C. Blaisdell,
Charles H. Taft,
William H. Potter,
Committee.

Boston, November 21, 1895.

Current News.

MEETING IN WESTERN PENNSYLVANIA.

A meeting of the local societies of Western Pennsylvania will be held January 21, 22, and 23.

Executive Committee.—J. G. Templeton, H. W. Arthur, O. L. Hertig, Geo. Shidle, C. M. George, and J. A. Libbey, chairman.

THE

International Dental Journal.

Vol. XVII. February, 1896. No. 2.

Original Communications.[1]

ELECTRICAL OSMOSIS FOR THE TREATMENT OF LIVING DENTINE.[2]

BY HENRY W. GILLETT, D.M.D., NEWPORT, R. I.

Mr. President and Gentlemen,—Electrical osmosis, electrical diffusion, anodal diffusion, and cataphoresis are terms used by different authorities to express nearly the same phenomena.

The first three terms will be recognized as entirely synonymous, and need no defining to make them intelligible.

Electrical osmosis, the one I have chosen for my title this evening, is probably the one having the widest acceptation among electricians.

Cataphoresis is a medical term which has come into use among electrotherapeutists, and is recognized by few electrical experts outside of those interested in medicine.

The definition of the term given by Dr. William J. Morton[3] seems to cover the ground fully. It is this:

"The movements of fluids, together with the substances they

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before The New York Institute of Stomatology, November 26, 1895.

[3] Cataphoresis and solution of H_2O_2 for bleaching teeth, etc., Dental Cosmos, June, 1895. Note also the terms electric diffusion and electric medicamental diffusion, proposed by Dr. W. J. Morton.

hold in solution, from the positive pole of electrodes conveying a continuous current in tissue towards the negative pole."

When we consider this definition in connection with the human tooth, which generations of our profession have been striving to penetrate with some drug which should modify its sensitiveness, or with applications which should modify morbid conditions of the tooth-pulp, it becomes at once important, and, indeed, imperative that we make use of this principle, if we find it possible to do so. It is not necessary for me to mention before this audience the many advantages to accrue, for both patient and operator, from any feasible and harmless method of subduing the sensitiveness of the dentine of the human tooth.

It is equally unnecessary for me to enumerate the many different means that have been tried to attain this end. It has not always happened that the means which have been tried and found helpful have proved harmless. The ill results from the use of arsenic and the strong mineral acids are examples of this fact. I have been amazed, within a year or two, to find a set of these so-called obtundents endorsed by members of our profession of recognized standing, which are of a most pernicious character. Upon applying to them simple tests within the reach of every intelligent operator, they reveal the fact that their efficiency is due to the most corrosive mineral acids.

Of course, every progressive operator has certain applications which he uses with success in some percentage of cases, but I think it is the universal experience to find that, in many of the cases where we need help most, none of these applications are of much assistance.

For several years I have been taking a keen interest in a method of applying drugs to sensitive dentine, which seemed to promise a more universal usefulness than anything which we have before had at our command.

I approached the matter with great hesitation because of my lack of knowledge of electrical principles. Finally, however, I found the key which simplified the problem for me. It has taken much labor to reduce the matter to a point where it is practicable. Since March I have been able to command, for daily use, a process for the control of the sensitiveness of dentine, which seems to be practically universal in its application, and from which I can conceive no possibility of ill results. As I go on, I find others have considered the same possibilities.

The earliest efforts along this particular line that I have been

able to hear of are those of Dr. D. F. McGraw,[1] now of California. I understood Dr. McGraw to have discarded the idea because of defects arising from crudeness of apparatus, and it is just that point which marks the dividing line between success and failure.

The apparatus needs to be specially adapted to our needs. The living dentine and tooth-pulp are many times more sensitive to the electrical current than most other tissues. It is consequently necessary that the current should be under the operator's complete control, so as to allow him to modify it by adding or withdrawing very small amounts.

Dr. A. C. Westlake, of this city, approached this subject later, but has given us no practical results, so far as I have learned.

Dr. John S. Marshall, of Chicago, has worked along a kindred line, but up to last August had not attempted to control sensitiveness of dentine.

As I look over my own papers on the subject, presented at Asbury Park, last August (one of which will appear in the *Dental Cosmos* later), I find that I have progressed, and that some of my statements need to be modified. Many points need to be restated, and others to be amplified, while still other points, about which I could then only guess, have now come within the realm of positive knowledge.

With your permission, however, I wish to go back to the earliest recorded experiments demonstrating the facts of electrical osmosis in living tissue.

The records of these experiments have been very satisfactorily collected, and added to by Dr. Frederick Peterson, and I wish to quote freely from his article in the recently published "International System of Electro-Therapeutics."[2] He concludes his definition of cataphoresis with the statement that it seems to be a purely physical process. These are his words:

"Physically and not physiologically speaking, it is almost certain that electrical endosmosis is a mechanical and not an electrolytic effect, for two reasons: first, the action will show itself in any single solution whenever a porous partition, such as plaster of Paris, stoneware, etc., is inserted in the path of the current, even when no electrolysis is taking place,—that is, no decomposition; and, secondly, because the phenomenon may be stated as follows: When-

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[1] Dental Review for 1888.

[2] An International System of Electro-Therapeutics, by Horatio R. Bigelow, M.D.: The F. A. Davis Co.

ever a capillary tube containing liquid sustains a difference of potential between its extremities, liquid is transferred through the tube towards the cathode. The fact that the flow is proportionate to the difference of potential with a given current is equivalent to the usual statement that the effect increases with the resistance of the septum, because, the greater the resistance, the greater the difference of pressure that a fixed current will establish between the surfaces. . . .

"The following facts explain the character of the process in a clearer and more popular form: If two compartments separated by a membrane are filled with a fluid and in each an electrode is placed, there is a streaming of the fluid through the septum in the direction of the galvanic current,—that is, from the positive to the negative pole,—so that in the course of time there is an increase of fluid in the negative compartment. This osmosis, as is well known, occurs naturally without the use of electricity between two dissimilar liquids, the direction of the osmotic current being from the lighter to the denser liquid. But if the anode is placed in the denser liquid and the cathode in the lighter, this natural osmotic current is not only overcome, but reversed. Du Bois Raymond termed this the cataphoric action of the constant current. This streaming movement is analogous to that taking place in the semi-solid sarcous substance of muscle when subjected to the constant current, and observed under the microscope,—a visible flowing of the contents of the muscular fibre from the positive to the negative pole, causing a swelling of the fibre at the negative end. Now, it has been found that the skin of animals is permeable to drugs. The degree of absorption varies in different animals, and depends upon the quality of drug employed and the manner of its application to the skin. Thus, the skin of the frog absorbs water or watery solutions rapidly, while that of man does not do so at all, because of the fat normally present upon the epidermis and in the pores. Solutions containing alcohol, ether, or chloroform, by removing the fat, render absorption easy. All substances which are volatile and corrode the epidermis, like carbolic acid, are readily absorbed. . . .

"The cataphoric action of electricity has often been made use of experimentally to introduce drugs into the system through the skin. The anode, moistened with a solution of strychnine, has been applied to the skin of a rabbit, the cathode being placed upon any indifferent spot, and in a few minutes the animal has died of strychnine-poisoning. In man, quinine and potassium iodide have been thus introduced and subsequently detected in the urine. . . .

"Efforts have been made more particulary, however, for the purpose of producing a local anæsthesia by the use of electrochemical osmosis. As far as I can learn, the first investigator in this direction was Dr. B. W. Richardson, who wrote two articles, 'Voltaic Narcotism,' in 1859. He began experimenting in October, 1858, by producing a local anæsthesia with a solution of morphine on the anode. Then, with a simple galvanic current and with tincture of aconite on the positive pole, he brought about complete anæsthesia of a rabbit's ear, after trying in vain to do so with the current alone. After this he made the following solution:

℞ Tinct. aconiti, ℥iii;
Ext. aconiti alc., ℈i;
Chloroform, ℥iii.—M.

"One-third of this was put on a sponge, which was wrapped around the upper part of the hind leg of a dog, after shaving it, and attached to the positive pole, the other pole being applied to the ankle. In eleven minutes there was complete anæsthesia to transfixion of pins anywhere between the electrodes. A minute later a subcutaneous section of the tendo Achillis was made without pain. At the end of an hour the limb was amputated about an inch below the knee without a wince until the bone was sawed, when the animal screamed once, but it was not known whether this was from pain or terror. There was no pain in the subsequent manipulations. Twenty minutes later the animal ate heartily and walked about unconcernedly upon three legs. The wound healed by first intention. Subsequently, transferring his experiments to mankind, he painlessly removed a one-inch nævus from the shoulder of a ten-weeks-old babe, after half an hour's voltaic narcotism, with five minims each of chloroform and tincture of aconite."

Richardson's articles aroused a storm of opposition, the correctness of his views was denied, and Richardson himself abandoned his position. The matter slumbered till 1886, when cocaine anæsthesia by cataphoresis was suggested by Wagner, in Germany, and others followed, so that the literature on the subject soon increased.

Peterson says, "My own early experience with electric cataphoresis extended over many months of time in 1888, and my experiments numbered much over a hundred, about a fourth of which I reported in detail in 1889. Actuated by the great diversity of opinion among the investigators I have quoted, I began at the foundation, in order to demonstrate to my own satisfaction the actual facts in a scientific manner."

Some of Dr. Peterson's experiments I wish to quote, following them with some of my own.

"EXPERIMENT NO. 6.

"*No Anæsthesia with Cocaine Alone.*—This experiment was undertaken for the purpose of ascertaining if the electric current really had any effect in hastening anæsthesia. A four-per-cent. solution of cocaine was applied to the skin of the dorsal surface of my left hand for twelve minutes by holding the open mouth of the bottle containing the solution against it. The skin surface in contact with the solution was one centimetre and a half in diameter. No anæsthesia of any kind was produced.

"EXPERIMENT NO. 7.

"*None with Ten-per-cent. Solution.*—For same purpose as No. 6. Soaked a metal sponge covered electrode, two centimetres square, in a ten-per-cent. solution of cocaine, and applied to skin over first interosseous of my left hand for ten minutes without current. No anæsthesia whatever produced.

"EXPERIMENT NO. 8.

"*No Anæsthesia with Current Alone.*—Same electrode as in No. 7 to same place. A large sponge covered wire-netting cathode, some eight by twelve centimetres square, in the palm of same hand. Sixteen cells of a Grenet battery for six minutes without cocaine. No anæsthesia whatever.

"EXPERIMENT NO. 9.

"*Current and Cocaine together cause Marked Anæsthesia.*—Same electrodes and application as in No. 8, but with ten-per-cent. solution cocaine on the anode. Contact for five minutes with sixteen cells of Grenet battery. Complete anæsthesia to touch, pain, and temperature lasting over an hour in surface in contact with anode. It is known that the anode normally paralyzes the vasomotor nerves, producing congestion and œdema, while cocaine has the opposite effect, contracting the capillaries; but, when applied together, the normal electric effect outbalances that of cocaine, and the part under the anode remains congested. The current itself with this strength is somewhat painful at first at the anode, but as anæsthesia appears, the pain gradually diminishes and ultimately disappears.

"EXPERIMENT NO. 10.

"Exactly same details in every respect as in No. 9, but applied to the hand of Dr. J. A. Booth instead of my own. Same anæsthesia as on myself. Repeated this the next day on Dr. Booth for seven minutes, with same result. The anæsthesia in these short applications is always limited to the area of the anode.

"EXPERIMENT NO. 11.

"*No Effect with Cathode.*—Exactly same electrodes and application as in No. 9. Same number of cells, but commutator reversed so that the ten-per-cent. solution of cocaine was on the cathode. Contact of current for five minutes. Result: continual increase of pain at spot under cathode and no anæsthesia whatever,—the very opposite effects produced by the anode.

"I had now satisfied myself that a watery solution of cocaine alone applied to the skin, or upon the cathode with a strong continuous current, and that the current alone without cocaine, could produce no cutaneous anæsthesia, but that there was an actual cataphoresis of the cocaine solution, and consequent anæsthesia of considerable duration with the anode. I then proceeded to make therapeutic use of this method.

"EXPERIMENT NO. 12.

"*Successful Use of Cocaine; Cataphoresis in a Case of Supra-orbital Neuralgia.*—Dr. E. C. Seguin kindly placed at my disposal an obstinate and severe case of right supra-orbital neuralgia. L. E., female, aged forty years. Duration of neuralgia, a year and a half. Everything tried unavailingly. Suffering every few minutes with the usual agonizing pains of the disease. There was slight analgesia over right half of the forehead and right side of the nose, but exquisite hyperæsthesia of the tactile sense in the same areas, so that a slight touch or breath of air was exceedingly painful. There was great tenderness on pressure. The two-centimetre square anode with a ten-per-cent. solution of cocaine was placed in the right supra-orbital region over a painful spot, and the eight by twelve centimetre sponge and wire cathode in the right palm. Nine Grenet cells were used for three minutes, then raised to eleven cells for two minutes longer, which caused prickling, but no pain; and then raised to thirteen cells, which was too painful, and was reduced to twelve cells, and continued for five minutes. The whole application lasted ten minutes without break of current.

There was no neuralgic pain during this time and the hyperæsthesia had disappeared. There was the expected anæsthesia. The patient was completely relieved from pain for from four to five hours. . . .

"EXPERIMENT NO. 27.

"*Cocaine and Aconitine Cataphoresis.*—I now thought it best to try some further experiments upon myself. A six by ten centimetre cathode was placed in the left palm, and the one centimetre anode over the left first interosseous, as before. The anode was well saturated with a mixture of aconitine and cocaine, as in the last experiment. Twelve chloride of silver cells; five minutes application. Result: complete anæsthesia to touch, pain, and temperature over a space three times the area of the anode, without burning sensation as when aconitine was used alone. There was at first great pallor of skin beneath the anode, which gradually gave way to slight redness in a quarter of an hour. There was slight return of tactile sense in fifteen minutes, and in twenty minutes slight hyperæsthesia to touch, temperature, and pain.

"EXPERIMENT NO. 28.

"*Trial without Current.*—Same electrode, saturated with same solutions as in No. 27. Held it on the back of my left hand without the galvanic current for eight minutes, frequently rubbing in order to hasten absorption. There was no effect whatever, save redness produced by rubbing; no anæsthesia.

"EXPERIMENT NO. 29.

"*Very Mild Current for a Longer Period of Time Successful.*—As in some of the experiments here described unpleasantly strong currents had been used, I tried upon myself the effect of a mild current for a longer period of application than usual. Same electrodes, points of contact, and solutions as in No. 27. Six chloride of silver cells; current imperceptible; ten minutes duration. Marked anæsthesia to pain, touch, and temperature resulted as before.

"When I took up the subject of anodal diffusion, in the winter of 1888 and 1889, the bulk of information at my command was limited and uncertain. There was so much controversy on every point, so much diversity of opinion, that even the existence of the cataphoretic power of electricity seemed to be as yet not scientifically proved. I therefore made some hundred experiments upon myself and patients, the most important of which have already been described above.

"The results of these experiments were summed up as follows: the current alone does not produce anæsthesia at either pole, although the anode has a transitory soothing effect over painful foci. A watery solution of cocaine applied to the skin is not absorbed, does not produce anæsthesia, except, perhaps, after an indefinitely long period. The same is true of chloroform and of an alcoholic solution of aconitine. A watery solution of cocaine is diffused through the skin and subcutaneous tissues by the anode, but not by the cathode. This is true of chloroform, aconitine, strychnine, potassium iodide, corrosive sublimate, tincture of iodine, and other medicaments. The anæsthesia produced by a ten- to twenty-per-cent. solution of cocaine on the anode is sufficient for small operations, and affords distinct relief for from four to eleven hours in cases of severe neuralgias in superficial nerves, and without constitutional effects."

I would recommend to practitioners, having occasion to deal with obstinate neuralgias, a careful study of Dr. Peterson's article.

My own first experiments were not accurately enough recorded to make it worth while to report them; suffice it to say that they demonstrated that the dentine could be affected by the cocaine and the current together. Some later experiments I will record here for comparison with those just quoted.

No. 1.—A fifteen-per-cent. aqueous solution of cocaine on cotton wound on positive electrode, applied to back of right hand, at a point where the sensibility to the prick of a fine instrument had been tested, the negative electrode, wet with a salt solution, applied to the palm of same hand. One milli of a seventeen volt current passed for ten minutes. Result: absence of superficial sensation, and I was able to pass instrument through the skin without pain over the area covered by the positive electrode.

No. 2.—A fifteen-per-cent. aqueous solution of cocaine applied on cotton to corresponding point and under the same conditions on back of left hand; no current used. At the end of ten minutes there had been no appreciable modification of the sensitiveness.

No. 3.—A ten-per-cent. salt solution on cotton on positive electrode applied to another tested point on back of left hand, and negative sponge electrode wet with same solution applied to palm of hand. Current applied for ten minutes, reaching a maximum of thirteen volts and about four millis. There was so much pain and burning as to make this a disagreeable experiment to try. Result: redness and irritation, but no effect upon the sensitiveness.

No. 4.—A fifteen-per-cent. aqueous solution of cocaine on cotton

was placed in a moderately sensitive cavity of decay in a tooth for fifteen minutes. No modification in sensitiveness took place.

No. 5.—Same case; same day. A fifteen per-cent. aqueous solution of cocaine on cotton, placed in another moderately sensitive cavity for ten minutes, with no resulting modification of sensitiveness.

No. 6.—Rubber dam applied, and twenty-five-per-cent. aqueous solution of cocaine applied on cotton to a very sensitive bicuspid cavity of medium size for twenty minutes, without the slightest effect upon the sensitiveness.

No. 7.—Same cavity as No. 6. Rubber dam in place. A twenty-five-per-cent. aqueous solution of cocaine on cotton in cavity; positive platinum electrode applied to cotton, and negative sponge electrode to the cheek. Electric current passed for thirteen minutes, beginning with a voltage of three, and attaining a maximum of fourteen and a half, and a maximum quantity of about two-thirds of a milli. Result: absolute freedom from all sensation to the vigorous use of an excavator for removal of decay, and to the use of bur for forming ample retaining grooves in cervical and side walls.

No. 8.—Sensitive buccal cavity in inferior third molar. Rubber dam in place. Positive electrode applied in cavity to cotton saturated with twenty-per-cent. sodium chloride solution. Current applied for twelve minutes, reaching a maximum of eight volts and one milli. Much diffused pain resulting while current was applied, but no anæsthetizing effect.

No. 9.—Same tooth and same conditions, with the exception of a ten-per-cent. sodium chloride solution. The current applied for ten minutes, reaching a maximum of nine volts and one and one-half millis. A severe pain extending around to the opposite bicuspid region and into the neck during application. No appreciable lessening of sensitiveness.

No. 10.—Same cavity. A fifteen-per-cent. aqueous solution of cocaine instead of the salt solution. Current applied during eleven minutes, reaching a maximum of ten volts and about two-thirds of a milli. No diffuse pain, a very little in tooth. Result: a marked lessening of sensitiveness of whole cavity, and entire removal of it in a large part of cavity.

As a rule, this class of cavity requires longer applications than approximal cavities, and it is sometimes difficult to affect that part which is out of the path of the current.

No. 11.—Coronal cavity in left superior second molar. Quite sensitive. Placed in a half-per-cent. solution of sodium chloride on

cotton in the cavity and applied current for ten minutes, beginning with a voltage of less than one, increasing it to eight and a half at the end of the ten minutes. The milliampère metre then recorded about a half milli. I was unable to work the current up faster because of the pain it caused. The sudden turning off of the current at the end of the ten minutes gave a very decided sensation (kick or kink, patients often call it) in the tooth. The sensitiveness of the dentine to the excavator had not been in the least diminished.

No. 12.—Same cavity as No. 11. A twenty-five-per-cent. aqueous solution of cocaine applied in this way, beginning with same voltage. After the first two or three minutes it was possible to increase the voltage much more rapidly, without undue pain, than was possible with the salt solution, this fact being seemingly due to the beginning anæsthetic effect of the cocaine. At the end of eight minutes seventeen volts (or twice the quantity given in No. 11) was being administered and with less pain. At the end of ten minutes there was no pain at all. The milliampère metre recorded about three-fourths of a milli. When the current was suddenly cut off, there was much less of the "kink" noted by the patient,—another indication of deep cocaine effect. Upon vigorous use of the excavator, using the same instrument as before and on the same place, the dentine was found *absolutely* free from all sensation. The patient, a girl of about fifteen, in response to close questioning, assured me that there was no sensitiveness whatever to the thorough excavation of the cavity after the use of the cocaine, whereas she flinched very promptly under careful efforts at removal of the decay with the same instrument before any application of cocaine had been made, and also after the application of the electric current alone, using the salt solution only for the purpose of making good electrical connection. It should be said that this patient and the one for Experiments Nos. 6 and 7 had never had the process used before, and that no explanations were made beyond the statement that I was going to try to relieve the sensitiveness, and that they should not be hurt.

The results of these experiments may be summed up as follows: Ten-per-cent. aqueous solution of cocaine applied on the positive electrode with a weak electric current for a few minutes will anæsthetize the skin. (Experiment No. 1.)

A similar cocaine solution applied for the same time without the current has no anæsthetic effect. (Experiment No. 2.)

The same electric current without the cocaine has no anæsthetic effect. (Experiment No. 3.)

Cocaine solutions of from fifteen to twenty-five per cent. applied in sensitive cavities, for ten or twenty minutes, do not modify their sensitiveness. (Experiments Nos. 4, 5, 6.)

The electric current alone applied to sensitive dentine, sodium-chloride solutions of varying strengths being added to insure good electrical connections, does not perceptibly modify the sensitiveness. (Experiments Nos. 8, 9, 11.)

Cocaine solutions and the electric current applied to sensitive dentine, together, *do* completely anæsthetize it; consequently the cocaine is the active agent. (Experiments Nos. 7, 10, 12.)

It seems probable that the exhibition of other drugs may produce the same results, and I have other experiments preparing to demonstrate the facts concerning certain other drugs. These I hope to find worth reporting later. I hesitate less about reporting results with cocaine without lengthy trial than with most other drugs, since, theoretically, it can do no possible harm to the tooth.

The effect of the cocaine in these applications does not seem to reach deeply into the dentine in most cases. By prolonging the application, however, the pulp itself may, in favorable cases, be anæsthetized, even through a layer of dentine.

It is quite often the case that a ten- or twelve-minute application will anæsthetize the dentine deeply enough to allow the greater portion or all of the cutting to be done painlessly, but for deep grooves it may be necessary to repeat the application. In cases where there is much sensitiveness, and consequently much time will be required to prepare the cavity at all, I find the time required for applying the cocaine is fully made up by the increased speed possible after the sensitiveness is under control.

I do not need to enlarge upon so familiar a fact as the comparative consumption of time in preparing cavities, similar, except for their degree of sensitiveness, or to recall how, in the case of a sensitive cavity for a nervous patient, it often requires an hour to do what may be done in ten minutes after the cavity has been thoroughly anæsthetized.

This treatment renders it possible to do for these nervous and hypersensitive organizations desirable operations, which, without some such means, are utterly impossible. It also enables the operator to perform much more satisfactory operations for sensitive children from twelve to sixteen years of age, and to do these operations (which would otherwise be entirely too formidable to contemplate) with no objection from the little patient and with no danger of exhaustion afterwards.

Holding, as I do, very decided views in favor of thoroughly performed operations, I find much relief from being able to perform such operations without regard to sensitiveness.

Of course, the operator who knows no difference in cavities, but selects a bur at the beginning, and completes the preparation of his cavity in one fell swoop, will not have much use for an obtunding process which requires time to apply. But for the careful operator, careful alike of his patients' best interests, his own reputation, and the honor of his profession,—for him I am confident that this process is to become a valued one.

As to the time the cocaine effect persists, I find it difficult to get accurate knowledge; I am not always able to be certain whether renewed sensitiveness is due to penetration through the anæsthetized layer or to returning sensation. I had expected that the effect would be more lasting than cocaine effects in tissues, where the circulation is more rapid. I have, however, seen one or two cases where there had been a profound effect produced and where there was a return of the sensitiveness in fifteen or twenty minutes.

As to the effect upon the pulp or the tooth, I have examined some of the teeth where the first applications were made, and I am unable to find any trace whatever of a permanent change in their condition.

With regard to the effect of the current itself, Dr. J. S. Marshall's[1] article in the American Academy's *Transactions*, and his continued use of applications of electricity for morbid and irritable conditions of the pulp, will perhaps be reassuring to those who fear ill effects upon the pulp.

Some of my first work with cocaine and electrical osmosis was done in my own mouth; stronger currents were used than I dare to apply in the mouths of my patients, and deep anæsthetic effects were obtained. No ill results have followed, and the tooth is normal in its sensitiveness after nearly a year's test. As to the applicability of the method, I find that it is almost universal. The exceptions are in the cases of the comparatively rare subjects who are not readily affected by cocaine, and the occasional case where the difficulties of insulating the tooth or cavity are too great.

This latter class of cases will be much smaller in the hands of the expert operator, and this added necessity for the rubber dam

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[1] Electricity as a Therapeutic Agent in the Treatment of Hyperæmia and Congestion of Pulp and the Peridental Membrane.—*Dental Cosmos*, November, 1891.

will stimulate the operator's ingenuity in applying it in difficult cases. I very seldom find a case where I am unable to use the method with success, if I desire to do so.

In my use of electrical osmosis I have found a single patient who is so sensitive to the current as to be only able to take a seven volt current as a maximum. For her I readily anæsthetized a bicuspid so as to remove a portion of the pulp, but a large molar cavity required a long application, and was only a partial success.

As to deep anæsthetic effects about the roots of teeth, I have not met with success in the limited trials I have made. I have received numerous queries as to the use of the method for extracting, but I see no probability of its replacing the present methods for that purpose. I have made one or two attempts to reach the nerve-branches entering the tooth by applying the electrodes on opposite sides of the gums. The results were not encouraging, and in the case where my most determined efforts were made, I produced a decidedly objectionable result in the breaking down of the gum tissue under the positive electrode. I have, however, obtained satisfactory results from cocaine cataphoresis on the sensitive gum about roots undergoing preparation for crowning.

It would seem to me feasible to treat by electrical osmosis that very troublesome condition resulting from undue wear or erosion of the grinding surfaces of molar teeth, where the sensitiveness is almost a menace to health, by reason of its preventing proper mastication, and where it defies the action of the most violent caustics.

For doing this work I have had made the instrument you see before you, technically an adapter or fractional volt selecter, the working of which I will explain.

A milliampère metre is also almost essential. This selecter is intended for use with the Edison one-hundred-and-ten-volt continous current. I have the Electro-Therapeutic Company at work devising a battery apparatus for use instead of the Edison current. I have not used batteries because I did not want to have the care of them, but when the incandescent current is not accessible, battery systems with a capacity of thirty or more volts may be successfully used with suitable modifying apparatus.

First, let me enumerate the precautions necessary in using the one-hundred-and-ten-volt current.

Have the selecter connected according to the instructions provided with it.

An absolute safeguard, but one not necessary if connections are

properly made, is to insulate the chair by placing linoleum or rubber under its feet, and also to see that gas-pipes, water-pipes, and any other wires are out of reach or protected from contact.

I always apply the rubber dam, as it is difficult, and often impossible, to prevent leakage of current through other tissues if this is not done.

Any metal fillings which will be in contact with the wet cotton in the cavity or with the electrode must be covered. The current from a metallic surface into dentine is irritating and painful. I find Gilbert's temporary stopping a very useful material for this purpose. Wax will also do. In cases where I am working on an approximal cavity in one tooth, and a filling in the next tooth is too close to allow of its satisfactory insulation, I apply the rubber at first only over the tooth to be worked upon, thus insulating it completely; or, if the rubber is already in place a second rubber may be applied over the tooth to be worked upon. The positive electrode should be of platinum, as most other metals are affected by the current, and are liable to stain the tooth.

These conditions being provided, see that your current is turned on. I always test this by touching the metal parts of the electrodes together, and watch the milliampère metre to observe the result.

This selecter is so arranged that when the needle is at zero, and contact of electrodes is made as described, about one milli will be recorded. Getting this result assures the operator that all connections have been made, and that the apparatus is ready. If, however, a larger quantity of current is indicated by the milliampère metre, it shows that the rheostat contact is not at the right place. This same proceeding would also serve to detect any breakdown in the rheostat if it had occurred. Twenty seconds serve to assure the operator on these points, if his apparatus is conveniently placed. I then wet the negative sponge electrode with water or dilute salt solution. I place in the cavity a pellet of absorbent cotton saturated with a twenty- to thirty-per-cent. cocaine solution. I prefer not to have this cotton extend outside of the cavity, and to keep the solution confined to the cavity as much as possible. This concentrates the current in the part I desire to affect.

The negative wet sponge electrode I usually allow the patient to hold most of the time. It is preferably to be applied about the face or neck, as near the tooth as is convenient. Having placed this and allowed the patient to take it, I apply the positive electrode to the cotton in the cavity, and begin slowly to increase the

current by turning the large fibre knob of the rheostat head in the direction indicated by the needle which records voltage. The first consciousness of the current sometimes comes to the patient as the typical little "kick" or "kink" of the galvanic current, but it is a very small one with this selecter. More often the patient is only conscious of an indefinite, gradually increasing pressure, and if the current is pushed too rapidly this may increase to pain. It is therefore necessary to watch the patient carefully, and to pause in the turning-on process as soon as the change in the eye of the patient indicates that he is beginning to feel the current to an uncomfortable degree.

After the first experience, if cautiously managed, a patient will usually give the operator all necessary indications for his guidance, and allow him to keep the current up to a point just short of pain.

After one experience with it, the sensation is readily born, even by sensitive children of twelve or fourteen. In fact, they are often the most enthusiastic about its use.

As the operator pauses at the point where the patient indicates that he is getting enough, or even turns back a little if there is too much current, it is well to assure the patient that any disagreeable sensation will subside promptly. It usually does this in from one half minute to two minutes, and then the voltage may be increased slowly and gradually, with pauses long enough for any disagreeable sensation to disappear.

Subjects differ very much in the amount of current they will bear without discomfort. It is usually found, however, that by very gradual increase, and by taking more time to reach the maximum in these sensitive cases, a sufficient amount may be applied, to any case, to attain the result of anæsthetizing the dentine.

It is my customary habit, as soon as I have opened into a sensitive cavity, to make an application lasting from eight to twelve minutes. If I have reason to expect difficulty with the case, I make the application longer. If the first application is not sufficient for all I wish to do, I repeat it later.

I have some ten or twelve cases on record where twenty to thirty minutes have been needed to get sufficient effect. These were all cases where both patient and operator felt compensated for the time spent. Most of them were either extremely sensitive teeth or subjects who could bear but little current, and several of these cases would have been all but impossible without the aid of this method.

On the other hand, I have numerous cases where ten or even eight minutes have been ample time for successful results.

Having reached a voltage likely to be sufficient, I allow it to stand at that point till the end of the application.

Fifteen to twenty volts will usually be attained in seven or eight minutes. In many cases, with small cavities and little sensitiveness to the current, twenty-five or thirty volts may be marked in the same time.

The higher voltage works more rapidly.

At the end of the application, I usually break connection at the negative electrode, as there is less often any shock in so doing. If the subject is very sensitive to the current, I turn the voltage down low before breaking connection.

Having concluded the application, I turn off the current in the selecter by means of the switch. This lever may also be used for concluding the application of current if you find no objectionable shock resulting.

Then I test the cavity, and finding it all right proceed as usual, bearing in mind that the effect may not have gone as deeply as I wish to go with my instruments, so it is still necessary to watch for signs of returning sensitiveness.

The expert electrical knowledge required for this process is not such as to be a formidable obstacle to any skilful practitioner. The instructions provided will serve to arm him with sufficient knowledge for his first cases, and the other needed knowledge will come to him quickly as he goes on with his work.

In connecting this selecter, it is only necessary to screw the plug provided into a lamp socket, and place the cords in the binding posts. Carry the wire from the positive binding post to the binding post of the milliampère metre, which is marked + (positive). Connect the cord attached to the positive platinum electrode to the other post of the milliampère metre. Now lead the cord of the negative electrode from the unused post of the selecter.

The electrodes may be readily detected by passing a current through a small piece of wet litmus paper. The positive pole will be found to redden the litmus, while the negative turns it blue.

Case A.—Mr. C. M., aged twenty, reports his teeth as very sensitive, and all cavities, even the smallest, prove so. Inferior second molar buccal cavity. Applied a twenty-per-cent. cocaine solution with electric current for twelve minutes,—seventeen volt current for the final third of the period. Result: entire absence of sensitiveness in the preparation of the cavity. For same patient

at same sitting, right superior first bicuspid corona distal cavity, twenty-per-cent. cocaine current for ten minutes, reaching a maximum of seventeen volts. Result: complete absence of sensitiveness except for final groove cutting. As the patient was anxious to be able to say that it had not hurt him at all, a second application was made about like the first, and the cavity completely anæsthetized. One of the most competent New York practitioners, in whose hands the patient had previously been, assured me afterwards that he had used every known remedy without success in the effort to even relieve the sensitiveness in this case.

Case B.—C. Y., aged fifteen. Mesial cavity in right central incisor, very sensitive. Fifteen-per-cent. cocaine current for eleven minutes up to a maximum of twenty-five volts. Result: complete anæsthesia of the dentine during the preparation of the cavity. Same patient and same sitting. Similar cavity in left central; same treatment, and similar results. The patient went to sleep during this second application, which, when we consider that this was his first experience, is good evidence that the process is not a painful one.

Case C.—Miss E. G., aged fifteen. Approximal cavities between the right superior bicuspids, so sensitive that the patient could scarcely bear the least touch in them. Twenty-per-cent. cocaine and current applied. Dr. C. A. Woodward called after I had begun my application, and I asked him to come to the chair.

I quote this case partly that he may tell you what he saw. In order to make sure of this case, I prolonged the application to twenty minutes. The voltage was not recorded, but it was seventeen or less. I then took a bur in the engine and cut the cavities out thoroughly without the slightest sensitiveness being found.

This is one of the cases which gave me evidence of the time in which sensation may return.

I left the chair for a few minutes, between five and ten, to speak with Dr. Woodward, and when I returned the territory which had not been sensitive when I stopped work was again as sensitive as it was at first.

A second application of eight minutes was made and the shaping of the cavities completed painlessly.

Case E.—Miss M. M., aged twenty-two. Inferior left cuspid, labial cavity, near gum, quite sensitive. Twenty-five-per-cent. cocaine solution, current for seven minutes up to a maximum of thirteen volts. Result: complete anæsthesia of the cavity during its preparation with a bur.

The apparatus, as I use it, is supplied by the Electro-Therapeutic Company, 32 East Twenty-third Street, New York.

I wish to acknowledge the intelligent assistance of their electrician, Mr. G. M. Wheeler, in working out the difficult mechanical details after I had elaborated the principles required for the process and apparatus.

HYPNOTISM: ITS VALUE TO THE DENTAL SPECIALIST.[1]

BY DR. GEORGE F. GRANT, BOSTON, MASS.

It is fair to state at the outset of this paper that it is written more in view of eliciting discussion of the subject than of imparting any instruction as to the direct means of inducing hypnosis for the purpose of lessening the pain or reducing the dread of dental operations.

This subject teems with interest for us as any subject dealing with an agent for which such claim is made must necessarily possess. Every considerate operator would be made happy by the safe, sure abolition of pain from the operations he is called upon to perform. It is a safe proposition that up to the present time no such agent has been obtained.

I am at present considering hypnosis in this list, though I am willing to withdraw it upon conviction.

My experience in practice is like that of most others. A common question now from patients is, "What do you think of hypnotism?" In order to give a reasonably intelligent reply, one must read up and obtain a smattering, at least, of what has been written on the subject, with a special view to its applicability to his use and needs.

I believe that the conditions governing the application of this agent to medicine or surgery are so widely different from those with which we have to do, that very little except the general principles can be applied to dental practice.

It seems too great a trespass upon your time to enter into the history of hypnotism, for it extends very far back into the earliest of recorded history. My wish is to take up the latest writers and observers on the subject and glean from them what can be made

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[1] Read before the American Academy of Dental Science, October 2, 1895.

valuable to us. One will find here rather puzzling variations of views.

First, as to the methods to be employed in the induction of the hypnotic state. Second, as to what percentage of people are susceptible to hypnotic suggestion. There are many other points upon which the opinions of students of this science differ, but I have selected those bearing most directly upon what it is desired to consider in a short essay.

The first great question is upon the means of producing hypnosis.

Abbé Faria said, in 1815, "The cause of sleep was in the person who was to be sent to sleep." "This (says Moll) is the main principle of hypnotism and of suggestion."

Besides this we have the rapidly-revolving mirror of Luys, used to produce speedy and extreme fatigue of the eye, the magnetic pass used by older magnetizers, the sound produced suddenly by striking a large gong, or a sudden ray from a Drummond light.

The effect can be produced through a sense of touch, even by gentle stroking of the skin. Others produce it by touches on the forehead, pressure upon the eyelids, etc. Then comes fixed attention, which is considered by some as the only means, while others combine it with mental methods, as Bernheim does.

Dr. Bonwill, in a paper on this subject, lays great stress on self-assertiveness on the part of the operator, and that "suggestion should be made in a loud, commanding tone, like a general commanding an army."

Dr. Warren and Dr. Faught, in discussing the paper, agreed that loudness of speech and commanding tone were quite unnecessary, as the same result could be obtained by a quiet tone.

Professor Newbold says, "Of all the means of heightening suggestibility with which we are acquainted, none is so easy of application and certain in its effects as the concentration of attention and limitation of the conscious field."

Dr. Osgood, of this city, says that the passes are unnecessary and smack of charlatanism.

We have here, then, many opinions as to the proper method of inducing this state.

Moll says, "Which of the above methods, or which combination of them, is the best for practical use? is a question the answer to which is not so simple that every one who has made a dozen experiments is justified in trying to reply to it."

I will now call your attention to the question of susceptibility. We here find a great difference in opinion between investigators.

Some claim the ability to hypnotize all subjects, even against their will (Donats), while others place the percentage very low.

Liébeault claims ninety-two per cent., Delboeuf eighty per cent., Bernheim and Ford claim over eighty per cent., while Bottey claims only thirty per cent., and Moll only twenty per cent. To compare, sift, and digest all these views seems no slight task for a man who is making the investigation with the purpose of adding one more agent to his list of aids in painless operation.

It seems to be generally agreed among men who have used hypnotic suggestion as a therapeutic agent, or as a means of performing painless surgical operations, that many complicated conditions exist, or may arise, which can only be properly met with by a systematic training, followed by careful and oft-repeated experiments. All this precedes the application of this science. We must first master the subject, then apply it to our specialty, if we intend making use of it.

Here a thought occurs which to me seems to have an important bearing upon our view of expediency.

The medical man would in all probability not find it necessary to induce the hypnotic state in many cases daily, nor would the surgeon perform operations continuously every day for from six to eight hours, as the dentist does. The majority of patients who visit the dentist require operations of a painful nature, while of those visiting a physician only a small percentage require or receive immediate surgical treatment.

This seems to me an important point for consideration, as even the most skilful or enthusiastic hypnotist would find that, whether he gave himself up to his subject or the subject submitted wholly to him, there would be so great a drain upon his mental force from such a continuous exertion, that when added to the physical and mental strain, inseparable from daily practice, it would tax the ordinary practitioner beyond his strength.

This seems a moderate view of this aspect of the question. While most of the men who have written, especially upon the dental side of the question, have given the impression that the art is easy of application, the very reverse is true of what the medical writers have to say. This is rather remarkable in view of the peculiarly sensitive organs upon which dental operations are to be performed; and, further, that all authors are not agreed that insensibility to pain is a feature of hypnosis. One rather gets the idea that it is a condition of unconsciousness of pre-existing pain, rather than insensibility to inflicted pain. A consideration of these obser-

vations rather leads to the hypothesis that the dentist sometimes mistakes a faith established by his reassuring manner for an hypnotic condition.

I think Dr. Bonwill's paper on hypnotism is a stronger exposition of what may be accomplished by considerate preparation of a patient for operation than it is of the value of hypnotic suggestion.

There is this much to be said of the results of investigation of this subject in the hospitals abroad, notably those of France and Germany, where most is known and the most extensive experiments have been made, that their results can only be regarded as establishing the existence of this great power for the benefit of mankind under conditions of nativity, habit of obedience, and strong predisposition to accept what is offered in the way of treatment. We all know that hospital practice is a widely different thing from office practice, and, if I am rightly informed, the physicians of foreign hospitals exercise far greater powers over the patients in such institutions than are permissible in kindred institutions in this country.

In order to restrict this paper to as close a bearing on the application of hypnotic suggestion in our specialty as could consistently be accomplished, I was obliged to omit much that is interesting,—namely, its psychological and physiological aspects, the dangers which of necessity are to be recognized and avoided; also the various theories advanced in explanation of the phenomena exhibited during hypnosis.

In my opinion the more thoroughly one reads and investigates the subject, the more clearly the fact is established that for our purpose it presents too many complex problems and requires much further investigation by minds trained to that especial kind of work. If it is to be used as an adjunct in dental operations, patients should bring their trained hypnotist to the dental chair, leaving the dental specialist to the performance of his legitimate functions.

In support of this last clause I cannot find better words than those of Dr. Osgood: "The dentist has no business to try to relieve every trouble of which a patient may complain, any more than I have to clear out a dental cavity without proper education and experience."

To that remark I give a hearty amen, and think it contains a whole world of application.

Upon the question as to whether a dental specialist might use hypnosis, after a course of training under an expert, I should say that weighing every consideration, those which I have tried to

present, with those which lack of space forces me to omit, it is well to be (in the words of Professor Newbold) "sceptical as to facts and cautious as to theories."

DENTAL EXAMINING BOARDS IN THE UNITED STATES AND PRELIMINARY EDUCATION.[1]

BY G. CARLETON BROWN, D.D.S., ELIZABETH, N. J.

Mr. President and Members of the Central Dental Association,—At the request of your Executive Committee, I, in a moment of weakness, agreed to read a paper to this society on "Examining Boards and Dental Education," or something of that kind. I had no sooner made this fatal error than our ubiquitous chairman of the Dinner Committee, Dr. Meeker, appeared upon the scene, and demanded the title of the paper. As I had not the slightest idea what I was going to say, I could not think of a title, so I told him to call it anything he pleased; then I had to wait until the programme appeared to find out what I was to write about. When I did find out, it struck me that the title gave me license to talk about almost anything, so that a general *pot-pourri* on dental education is the result. I trust you will excuse the crude form in which it is served.

A *résumé* of the question in regard to the influence of examining boards on dental education would necessarily become a history of the advance of modern dentistry, and in saying this and in claiming a large share of this advance for the examining boards, I do not mean to detract a particle from the great work that has been done by the colleges; to them, first and foremost, belongs the credit for the advanced standing of the profession of dentistry to-day. But, I greatly doubt whether the colleges would have attained to their present standing, or have demanded the high standard now required of graduates, if it had not been for the examining boards. There are several ways of looking at why and how this influence came into existence; but I think the most rational is that the colleges are not working entirely from a philanthropic stand-point, while the examining boards are. The colleges are pecuniarily in-

[1] Read before the Central Dental Association of Northern New Jersey, December 16, 1895.

terested in their work, and are, of course, striving to make all the money they can, and in some cases more than they have any business to make,—but, as Rudyard Kipling says, "that's another story,"—while the members of the examining boards are sacrificing much time, and in nearly all cases are spending their own money, to elevate the standard of their profession; and this, without the slightest chance of any pecuniary benefit to themselves.

These facts being accepted, with the further statement that in spite of the antagonistic attitude assumed by some of the colleges towards the boards, the latter have none but the kindliest feelings to the colleges, and when they make criticisms and suggest certain reforms it is not because they love the colleges less, but their profession more.

The elevating of the standard of dentistry demanded by the profession must be done, to a great extent, through the educational mediums, and as public institutions they are certainly open to criticism if they fail to properly equip their graduates.

Any one who has been an unprejudiced observer of the changes in the teachings of the schools and the character of the material turned out since the establishment of the State examinations must admit that the boards have had an influence on the colleges, and in many instances have been the means of procuring for the student a higher and better education; this being the case, is it not the duty of the boards to continue the work by pointing out the defects which still exist, and by suggesting reforms?

The only question that now arises is, Should these discussions be confined to the national associations representing the colleges and the boards, or should the matter be openly and freely discussed by the profession at large? I consider the latter the proper course, hence this paper.

A few years ago it seemed the fashion for a man, when he thought he could not make a success of anything else, to either enter the ministry or take up dentistry as a profession; if the latter were his choice, the mere fact that he had not the preliminary education that would allow him to receive and assimilate the scientific and theoretical teachings of the profession did not enter into the question any more than did the fact of whether he had the requisite amount of mechanical adaptability.

The colleges recognize this by theoretically requiring a preliminary education; I say theoretically, for what they actually require hardly deserves even the name of education.

In making these charges I do not say that some schools may

not give a proper preliminary examination, but I do know that the examination, if it exists at all in certain schools, must be a perfect farce. In making this statement I know I shall be borne out by members of any examining board who require a written examination. I will give you a few illustrations to demonstrate the point. These illustrations are taken from the papers of recent graduates and are exactly as written, none being selected unless plainly written so that no mistakes could be attributed to defective penmanship.

Q. What relation to dental caries do the micro-organisms bear?

A. Dental caries is a destruction of the tooth substance which is hard and micro-organisms is effect the soft parts of a body.

Q. What acid is produced by the micro-organisms?

A. Toxic acid is produced by the micro-organisms.

Q. How?

A. By the action of them upon the soft tissues, these be open.

Q. What is plethora?

A. Is a disease of the Pleura.

Q. What is disease?

A. Is the disturbance of the equlebrum or preversion of circulation.

Q. What is fever?

A. the riseing of the tempeture caused by too much blood in a part.

Q. What is shock?

A. shock is the suddent checking of the nerves caused by accident.

Q. What is the difference between a narcotic and an hypnotic?

A. Narcotic acts on part the small intestines. Hypnotic acts on the whole large intestines.

Q. What are the stages of anæsthesia?

A. drowsiness sleepy feelings long breathing Stifness of muscles and relaxation of the parts.

Q. What are the effects of inhaling nitrite of amyl?

A. It produces krowness.

Now, as to a student's mechanical adaptability, granted a first-class education and the receptive qualities necessary for a good scientific education, of what avail is it "if he hasn't it in his fingers?"—as Dr. Eaton has so tersely expressed it,—he will never make a dentist, and of this fact the colleges have as yet taken no notice; they might perhaps refuse to graduate him at the end of his three years course, even if he stands first in his class in theory;

but, would they do this? And if they did, would it not be pretty hard on the student? But, is it not worse to have an incompetent man turned loose upon the public? And here is where the examining boards come in again, as our friend, Professor Flagg, says, "the board steps up and says 'Hold!'" and the young man steps out into "innocuous desuetude" with three of the best years of his life wasted.

This is certainly hard on all concerned,—the boards, the college, and the student. But, hard as it may be, the boards must do their duty as State officials and servants of the public. There is no question about its being hard on the student; the college from which he graduated should feel a twinge of remorse for having taken his time and money and failed to give him what he has paid for; they (the colleges) may have done all in their power, but if the student did not "have it in his fingers" to start with, all the colleges in the country could not have given it to him; their mission being only to develop. Where is the remedy? Many, I am sure, must have given the subject thought, but the first practicable suggestion that I have seen comes from Dr. Crouse, who says, "A young man may be bright, a good student, and well grounded in the classics, and yet, an attempt to make a dentist of him would destroy his usefulness in life, make him a detriment to the community in which he practises, and not a credit to the dental profession. Therefore, the first six weeks of the college course should be spent in finding out who are properly qualified, by nature as well as by training, to be dentists; and those who are not fit should have their fees refunded and should be persuaded to select a more suitable calling in life. In short, the 'plucking' should be done at the beginning of the college course rather than at the end." Here is something for the faculties to think about; and by adopting some such system they will save the boards many unhappy moments.

And while they are occupied with this subject, it would be well to look more carefully after the training of the students in the practical departments. It is a noticeable fact that since the increase of the term of pupilage,—from two to three years,—while the scientific and theoretical knowledge of the graduates has increased to a marked degree, the practical has not only failed to keep pace with it, but has actually decreased. Are we, as a profession, sacrificing the practical to the theoretical? Whoever are leading in this matter, the profession or the professors, damage is being done and a halt should be called.

According to the reports given by students, the means and apparatus in some of the colleges for pursuing the practical studies are absurdly inadequate, in some instances there being only one blow-pipe for the use of several hundred students, within many cases no chance of obtaining instruction in its use even then; the demonstrator, so called, being engaged in the more important (?) work of looking after the business part of the insertion of artificial dentures, for a consideration, said consideration, by the way, netting a good round profit to the college. In fact, the colleges seem to be giving instruction only in the direction in which there is a direct pecuniary benefit to themselves, instead of educating the student to a higher standard of general proficiency in mechanics.

I have had graduates tell me that the case they soldered before the examining board was the first piece of metal work they had ever done, and one man acknowledged that he had never had a blow pipe in his hand before. The colleges may say that this evidence is not trustworthy, as it comes from men who, after having made a poor piece of work for us, are trying to throw the responsibility on the college; this might have more weight if it were not for the fact that the story comes from so many different graduates, and is so amply corroborated by the work they do at the examinations. If you will carefully examine the specimens which I herewith submit, I think you will come to the conclusion that there are reforms needed in this direction. The accompanying specimens have been selected and mounted by Dr. Barlow,—who has charge of the mechanical department of the New Jersey board,—from work done within the last year, as part of the practical examination required from each applicant.

Have the men who did this work received a proper education to enable them to practise dentistry?

I think this will prove to your satisfaction that in some cases the practical side is being sacrificed to the theoretical. That others have noticed the same thing is shown by the following extract from the report of the Committee on Practice of the New York State Society, read at Albany, May 8, 1895. "Our institutions of learning should take heed that the manual skill of their graduates does not suffer on account of increased theoretical training."

The colleges may claim that every student has to submit a satisfactory piece of metal work as part of his examination and a prerequisite to graduation; true, but do they inquire carefully into the question of who made the piece? That, however, is part of the other story I am coming to later.

Leaving the mechanical department for the operative, we perhaps find an improvement. But does not the effort to swell the college treasury overbalance the educational features? Are there not many teeth that by proper treatment could be saved sacrificed to make way for other work that would pay better, thus doing injury to patients and depriving the student of an important means of education? How many students, when they graduate, are really competent to contend with the complicated cases of pulpless or abscessed teeth?

If any of you will stop and think of the many difficulties you have had to contend with and master for yourselves, since you commenced active practice, that could have been greatly simplified by proper instruction from a demonstrator during your collegiate course, you will better appreciate the point I am trying to emphasize.

Is it not just as important that there should be a competent corps of demonstrators as of lecturers? Now, as a rule, there is one head demonstrator whose duty it is to apportion the patients and handle the gold and cash, these occupations leaving him little time to assist and advise the students in their work, these latter functions being left to undergraduates, who are appointed assistant demonstrators. If the colleges would provide a sufficient number of first-class demonstrators to be constantly on hand during clinic hours in order to personally instruct students in the correct diagnosis and treatment of cases, the percentage of failures before the examining boards would be materially decreased. These remarks will apply equally well to either department of the practical education in our institutions.

While on the subject of college clinics I cannot resist again alluding to the matter of fees. The present system employed in many institutions of having fixed prices for operations, places them about on a par with the so-called "associations" which have done so much to lower the standard of dentistry in the public mind. In both cases the bulk of the work is done by inexperienced and incompetent men; in the associations, because that kind of help comes cheap, and in the colleges, because the workmen are students. These methods have taken away any right which the clinics might once have had to be called free.

One means of cementing the colleges and the profession more closely together would be for the former to return to the old method of simply charging for the material used, and making the clinic a dispensary in the true meaning of the word.

The method of procedure in the mechanical examination before the New Jersey board is as follows: Every candidate is required to make a metal plate, band it, grind and back the teeth, and invest ready for soldering before the board. Some time since, it became apparent that in a great many instances the character of the preparatory work and the final soldering differed so markedly that it was impossible that the same person should have done both. This led to an investigation, and it was found that there were persons who made a regular business of supplying students, who were to appear before the board, with plates ready for soldering; it was also found that these same persons were in the habit of making the graduating cases for students in the colleges, charging them different prices, according to style and finish. The board met this difficulty by requiring each applicant to make an affidavit stating that he did all the work on his plate himself, without assistance from any one.

The fact that a student can buy a plate, present it, and have it accepted as his own work in college, certainly confirms my previous statement as to the lax way in which the clinics are conducted. A demonstrator in the mechanical department certainly should know whether a graduating piece was made in the college laboratory or not. But, worse even than this comes the report that in some cases the demonstrators have themselves made these plates for the students, they, of course, being paid for the same.

Another reported condition of affairs in one of our colleges seems to me, if true, to deserve such unqualified disapproval from the profession that a continuance of such practice will henceforth be impossible. It is, in short, that a certain dental house holds such a large interest in one of our colleges that the students say they dare not buy their instruments from other houses, because by so doing they would jeopardize their chances of graduating. If this report is true, taken in connection with the other matters which I have laid before you, is it not time that the profession at large insisted on knowing more about the way in which our institutions are conducted; and, where reforms are needed, insist on their not only being introduced, but lived up to?

In conclusion, I wish to state that no charge in this paper has been aimed at any particular college, the defects mentioned being distributed among the different institutions; there are some however, that may, perhaps, lay claim to all. On the other hand, there are certain colleges to which these criticisms are in no way applicable.

Let the profession, the colleges, and the boards unite their forces and work together in this matter, and a higher standard is bound to result.

"RESISTIBILITY."

BY DR. G. A. MILLS, NEW YORK.

We are indebted to the late Professor Garretson for the use of this term, and we think that a consideration of its wide-spread application might be profitable. We are sure that as dentists we are widely at fault in the care of our patient's humane interests. Doubtless the cause of this lies in the fact that mechanics have ruled a larger part of our procedure in practice. The need of the hour was never so apparent that we should know what to do and why we should do it.

True science has not been our practical leader. While a few have had the ambitious industry to investigate, too many more have laid back and cavilled at the impracticability of "so much science." But who will have the hardihood to say that these delving labors have not caused us to be face to face with the stern necessity of true scientific knowledge, so that the best may be done with our daily practice? We should say thanks to those who have given us some facts that now form a nucleus for future, better doings. Dealing with life is a more serious and responsible affair than many take into their thoughtful consideration,—some from a lack of thought, and many more because of their mad race for gain. We wish that the hope for better things might be looked for among the mass as the advance along the lines of a more liberal culture that just now we hear emphasized is carried out. "Resistibility," homely interpreted, means how much can the bodies bear from us in the application of what we apply as remedial. Disease always advances in the lines of least resistance. Some bodies are so fortified that a vast amount of malpractice will make no inroad, while others are easily affected and laid under great stress of danger, sometimes beyond the possibility of recovery. We are constantly coming in contact with such evidences. "Health is the most perfect germicide." This maxim embodies the whole subject in a nutshell. Idiosyncrasies are more or less exceptions to the rule that is considered general. The application of this knowledge, found in the term we are considering, is invaluable in making a diagnosis. We say that some are born with endowments,—special, of course.

They have an advantage; but study and observation will, or can, enhance an acquired ability. Some have not the capacity ever to attain the ability for helpful service to living tissues. They have no surgical capacity. As an illustration: In a case where alveolar abscess had been dealt with successfully, but the practitioner did not know it, and had vigorously used the bur, and the result was that he had produced a large ridge of scar tissue which he mistook for a further disturbance. The patient died not long after, not because of this blunder, yet had he lived he would have gone on inflicting his ignorance. Never was there more need of care and caution in the thought of our subject than these days of parlor machinery that is so manifested in practice. We do believe in the value of motor power in our practice, but we also tremendously believe it is shockingly overdone. Too much of this is for effect, and some in order to be on a footing of our neighbors. It should be always our desire to perform operations within the line of the least infringement of sacrifice in time and endurance that may be essential for the best results. Indefinitely we could enumerate the lines of application of this term.

This word was one of the outcomes of the late meeting of the New Jersey State Society at Asbury Park, and we have felt like italicizing it every time it has come into our thought. We only trust some one will emphasize it more effectively than we have.

Reports of Society Meetings.

AMERICAN ACADEMY OF DENTAL SCIENCE.

THE regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, October 2, 1895, at six o'clock, President Smith in the chair.

President Smith.—Gentlemen,—The essayist of this evening certainly needs no introduction to the Academy. I can only say that it gives me great pleasure to present to you Dr. George F. Grant, who will read a paper on "Hypnotism: Its Value to the Dental Specialist."

(For Dr. Grant's paper, see page 83.)

DISCUSSION.

President Smith.—Will Professor Fillebrown kindly open the discussion.

Dr. Fillebrown.—I thank the president for the opinion that I may know something about this subject and be ready to speak about it. I have pronounced opinions upon it, but there doesn't seem to be much latitude left for me to express them, as, according to the paper, dentists are debarred from using suggestions at all.

The paper is an excellent *résumé* of what has been said upon the subject. I hoped that the essayist to-night was to give us something practical,—something from his own experience. However, I am very glad that the subject has excited interest enough to bring out a paper from any one aside from myself. I think that a very distinct gain.

I believe that the modern dentist, and particularly a member of this Academy, is something more than a mere tooth-puller or a tooth-plugger; that in his daily work he considers other conditions of the system and the relations of the teeth to them.

I believe that a dentist is bound to know enough to use an anæsthetic; I think he is bound to know when and how to use a narcotic; I think he is bound to know enough to be ready to meet the emergencies that may occur during his dental operations in whatever form they may come. Now, I say that a dentist who does not know how to use every kind of a sedative, or who is not able to comprehend and get a practical knowledge of a matter that is as well understood as mental suggestion is to-day, is not fully equipped for his profession. We are bound by our relations to ourselves, by our relations to our patients, by our professional relations to the community, to be that much of medical men in order to do our duty to our patients. Now, as medical men, I say we are bound to know something of mental suggestion and of its power, and I, for one, offer no excuse for presuming to know what are the accidents that may occur and what I have to guard against. I say that I believe it is our duty to do that, and from that basis I proceed to say something of what I know about hypnotism.

I do not pretend to be an authority for others in this matter, but I do believe that three years constant study of suggestion, using it daily in my practice and reading every author that I could get hold of, is sufficient to make me an authority for myself. I believe I have a fair understanding of the subject. In the works of

such authors as Bernheim, Moll, Luys, and Charcot we find the same opinions are repeated; all quote the same facts; they all agree in their description of the same conditions; they all acknowledge the same dangers; they all recommend the same remedies for the same dangers; and when writers agree so fully, their opinions on any matter should not be difficult to understand. In fact, I believe that to-day there is not a therapeutic agent whose actions, limitations, and possibilities are better defined than that of mental suggestion, and there is not a single remedial agent that a man can use any more intelligently than this. If you prohibit the use of suggestion by a dental surgeon, what right has he to use opium, chloroform, or nitrous oxide gas? Here sits a man that, willing or unwilling, is one of the most successful practitioners of the art to-day, and a suggestion that he once made did me more good than anything that I got out of any book. Though I have been using suggestions for several years in my practice, I do not think that for a year and a half I have, in the sense spoken of here to-night, hypnotized a patient, and yet every one that was at all willing received the benefit of suggestion.

I was speaking to Dr. Andrews a moment ago of a patient that was in my chair on Monday. Three years ago I relieved her from a terror of dental operations, which was so powerful that she found it impossible to approach a dentist's office. She was in my office last Monday to have a tooth filled, and it had been so long since her last visit that she was again quite nervous. I felt her pulse and found her heart beating hard. After suggestion for a little time, I prepared and filled the cavity, with no pain and with very little disturbance.

I will mention another case. A young girl, twelve years old, very nervous indeed; she had been under treatment for nervous disturbance; she came to my hand at the close of the day, after trying for two hours to submit to the extraction of a tooth with gas; and could not be induced to even breathe the gas; and was then nearly in hysterics and her mother sadly disappointed. By my use of suggestion in two minutes she ceased sobbing and sat down in my operating-chair, and in three minutes more she voluntarily and quietly opened her mouth and allowed me to extract a first molar without flinching.

You may judge of her mother's astonishment and delight.

The action of the mind in making a suggestion has been made very plain by Dr. W. H. Myers, of London, an active member of the European Society for Psychical Research. In the transactions

of that society there are, perhaps, one hundred pages in all devoted to his discussion of the matter. He showed very clearly that the mind has two layers as it were,—a liminal or conscious layer and a subliminal or unconscious layer. One is the mind that we know about in which all acts of volition originate; the other, where all habits lie that we do not directly control. He contends that it is through the communication of one subconscious mind with the other that thought transferrence takes place. My own experience seems to give evidence of the truth of this phenomenon. If I am standing by my patient and want to produce a feeling of repose in my patient, I first want a reposeful feeling myself, and that voluntary action of mine will set my subliminal consciousness at work, and it seems to me that gives origin to the same thought and a similar relation between the liminal and subliminal consciousness of the patient, and in one, two, or maybe five minutes that same reposeful feeling possesses the patient. That is hypnosis, but not to a degree sufficient to effect the consciousness. I don't want to take that into consideration at all; it is the bugbear of being put beyond the limits of their own willpower that so many people object to, but I do not need or want to effect the consciousness or will in the least. All I want to do is to remove the fear of the operation and alleviate the pain of cutting the tooth. Medical practitioners will tell you that many diseases are largely exaggerated by fear, and if in these cases you can remove fear, you can generally remove the pain. In nine cases out of ten hypnotic suggestion answers this purpose.

I have now given you specimens of my experiences, and could give you a volume if there were time. I want to hear what Dr. Stevens can tell us of his experience.

Dr. Stevens.—There is this idea that I would suggest: if all dental practitioners were honest men, it might be safe to accept hypnotism for our purposes. If all practitioners were like Dr. Fillebrown, and did not care about carrying the suggestion beyond the stage in which dental operations could be performed without discomfort to the patient, it would be all right. But they are not all like that, and I am afraid it would be bad for the reputation of dentistry to introduce hypnotism into our practice, and my advice is, don't.

Dr. Fillebrown.—That does not quite answer my question. I know that Dr. Stevens does exert an influence over his patients more beneficial than most operators, and can perform dental operations for many that are unable or unwilling to undergo the operation, under ordinary conditions. How practical does he make it?

We need not call it hypnotism, call it anything; but will the doctor tell us what he does, and how he succeeds with it.

Dr. Stevens.—If I have a patient who is extremely nervous, I try, through my will to control that nervousness; I try to calm their nerves and quiet them; to get them into that condition in which they will allow me to operate without interference, and I have often succeeded.

President Smith.—Not in all cases?

Dr. Stevens.—No, not always; but I have many times succeeded in that way when I am confident I could have done nothing with other means at my command. When the thing can be done, within limits, it is all right. Of course if a patient is susceptible to hypnotism, in most cases it can be carried to almost any extent. I do not know what Dr. Fillebrown referred to when he spoke, unless it was the use of mental suggestions rather than verbal.

Many times I have had children who have been extremely nervous, and it was almost impossible to do anything with them before my suggesting to them to "let go of themselves," not to resist, to relax the muscles. That is half the battle; you must try to get them to give themselves up entirely, and many of my patients have had operations performed without exhibiting any nervousness at all, who at first would not allow me to put an instrument in their mouths without their screaming.

Dr. Fillebrown.—A good many years ago, when I was young and enthusiastic, I happened to be in Boston, and I heard that Dr. Wm. H. Atkinson was to give a clinic at the office of Dr. Dickerman, in Taunton. I wanted so much to see him that I took the trouble to go down there. The patient on whom he was about to clinic was a young boy, and his teeth were desperately sensitive; the cavity was in an inferior right second molar, and it was with great difficulty that any one could get the boy to allow an examination of it. The doctor had great ability to operate without hurting patients. After talking quietly to the lad for some minutes he took his instruments and went to work and cut that cavity all out, and the boy never whimpered. Dr. Ambrose Lawrence was there, and in his brusque way of speaking asked Dr. Atkinson, "How do you do it?" The doctor, with a quiet smile, replied, "Oh! the angels help me." "Yes," says Dr. Lawrence, "we all know that, but *how* do *you* do it?"

Now, Dr. Stevens, how do you do it? You told us that you try to calm their nerves and that you succeeded; and you went on and said that you did it through your will power, but what we want to

know is, *How* do you do it? Can it be formulated? Can the rest of us do it?

Dr. Stevens.—I cannot tell you.

Dr. Fillebrown.—I believe I did tell you when I described the action of the subliminal consciousness. I believe that is the explanation of Dr. Atkinson's success as an operator, not only as a dentist, but as a surgeon. I have heard that when he was about to perform an operation in oral surgery, the first thing he would do would be to get the patient a cup of tea, sympathize with him, tell him that one good thing about an operation of that kind was that it didn't pain much, and in a short time bur out the necrosed bone, and the patient scarcely flinched at all and thought the operation a relief. Dr. Atkinson had a subliminal consciousness of wonderful power, and could control almost everybody around him. Many of us could not expect to meet with the success that he had, but if we study the subject carefully, and acquire the knowledge that is now available, I think we will have little trouble in successfully using it.

Not long ago a friend of mine had a patient, a young boy, that would faint dead away the moment his teeth were touched. Knowing something about what I had done in this line, he asked me if I could do anything with a case of that kind, and I told him to send the boy to me, and I would try. He was glad to get rid of him, and the boy came to me. The first time he felt quite faint. I did not want to hurry matters, so I made another appointment; the second visit he got along very well, the third time a little better, and the fourth time there was no trouble whatever, and I was able during the four sittings to do all the work necessary on his teeth.

Dishonest dentists are very few and far between,—certainly among the class who will be interested in this discussion. I do not believe there is any reason at all why we should not interest ourselves in the matter of hypnotic suggestion, and use it for the benefit of our patients,—in fact, I believe we have no right to refuse to investigate any appliance or method which will make it easier for our patients to undergo dental operations.

Dr. Stevens.—I will say just one word in regard to what Dr. Fillebrown has brought up,—that is, in regard to the question of having patients become unconscious at all. It seems to me there is a vast difference between giving an anæsthetic or a narcotic and producing hypnotism. An anæsthetic can now be given without a person's knowledge or consent; hypnotism can be produced without their consent and sometimes without their knowledge. A per-

son who has once been hypnotized can readily be brought under hypnotic influence again, and even at a distance.

Dr. Fillebrown.—Such cases are very rare.

Dr. Grant.—That is one point that I omitted, because I did not write the paper with any idea of influencing those who understood it not to use it, but merely to examine into its practical value to us. What Dr. Stevens has said is substantiated by every writer, friend or foe, on hypnotic suggestion. Of course, at the present day hypnotic suggestion is generally regarded as a perfectly possible thing, and almost every writer takes especial pains to speak of its dangers and to warn operators against them, even of careless suggestion, which is of course a lesser evil. And they all say that persons who can be hypnotized become more susceptible, and that they will obey even careless suggestions. Dr. Osgood, who has said more about it than any one around here, takes particular pains to say that he sometimes insures patients against the danger that he recognized they are liable to by saying to them in the hypnotic state, "No one but I can ever hypnotize you again." It does not seem necessary to take such precaution if he did not recognize the possibility of danger to the patient. Dr. Fillebrown is the only one who has written on the subject who does not admit that it is a dangerous influence to deal with; all the people who do it professionally agree upon that point.

President Smith.—I would like to ask some of you gentlemen who seem to understand this subject, if it is a conceded fact that if a person who produces this hypnotism on a patient should say to that person while in the hypnotic state, "You can never be hypnotized by any one but me," that the patient would not be susceptible to the influence of any other hypnotist?

Dr. Fillebrown.—That is true.

Dr. Grant.—Yes, it is a fact.

Dr. Fillebrown.—All our discussion about dangers will not hinder dishonest people from practising hypnotism. Again I say, is that any reason why we should refuse to give our patients the benefit of it in this mild form? These cases that have been mentioned here to-night are the extreme instances,—they are the one of a thousand. Charcot said that there was not more than one out of a thousand subjects that could be hypnotized without their knowledge or consent.

I will quote Professor William James; none will question his knowledge or familiarity with this subject. He told me himself that he thought it not dangerous to the patient, providing there

were honest operators, this provision being necessary in the use of any remedy. I talked with him a little in regard to my use of it in professional life, and my teaching it to others, and asked if he would advise it, and he said, "Yes, by all means, do it." So you see there is a difference of opinion as regards the danger connected with it. I do know there is no unavoidable danger in it, and any one that refuses to use it is not giving his patients all the ease that is in his power to give them.

Dr. Stevens.—Of course, I agree with Dr. Fillebrown in this matter of hypnotic suggestion to a certain extent, but I do not think that Dr. Fillebrown has taken into consideration the full force of this matter,—I mean in those cases where the patient becomes unconscious, and I could relate two or three cases in point which will show the degree to which people are sometimes affected.

Some years ago, when I was a student, a young lady came into the office to have a tooth extracted. The lady was a stranger to me and wished to take gas. I took out the tooth and she came out of the gas apparently all right, and after she had rinsed the blood from her mouth, she lay back in her chair in a sleepy, semi-conscious condition. My preceptor was there at the time, and he felt of her pulse and said there was nothing to cause alarm, but she remained in this state for some little time, and when she finally came out of it, and got ready to go, my preceptor thought I had better go home with her. She lived out of town, but I got her home all right. I heard nothing from her until, two or three years afterwards, when I was in practice by myself, she came into my office with a friend. I performed an operation for the friend and she sat in the reception-room reading. Just before completing the operation I had occasion to step into the reception-room, and after a little conversation with her,—at which time she appeared all right,—I returned to my patient and finished what I was doing. Returning to the reception-room, we found her lying back in her chair in a state similiar to that into which she relapsed on her first visit to me. I asked her friend if she knew whether "the lady had been hypnotized at any time," and was informed that she had been. I did not know how to restore her to consciousness. She sang us some "Trilby" songs and seemed to be quite comfortable, and unconcerned as to where she was. She missed the train they had intended to take, and as the time passed on I suggested in a confident manner that she would be ready to take the next train (fervently hoping that she would), and sure enough she was all right in time. Now, what caused that hypnotic state? I knew

nothing about hypnotism at the time, but I believe now my suggestion threw it off.

I have another case in mind. A lady, Mrs. B., an entire stranger to me, came into my office to have her teeth examined, and I found that one of the under teeth was beyond all help and needed to be extracted. When I finished the examination I noticed that she appeared to be sort of indifferent to what was going on, and she laid back in the chair with a rather absent-minded expression. I told her, "There is one tooth there which needs to be taken out." Without manifesting much interest in it, she said, "Take it out;" and I did so, without any pain to the patient. That was also before I knew anything about hypnotism, but I thought of this incident afterwards when she came again in the office, and the opportunity was given me to try an experiment. She had a bottle of tooth-powder, and when she put it down, she said to me, "Now, don't you let me forget that tooth-powder." I replied, earnestly, "You cannot pass without picking it up." A few days afterwards she came in and said, "Doctor, I wish you would fix matters up between me and that bottle of tooth-powder. I can't get by it without picking it up." I told her she would not be troubled any more, and she was not. I might add that she was one of that kind who always scouted the idea of being hypnotized, and thought any one was dreadfully weak-minded to allow themselves to be so influenced.

Dr. Grant.—I would like to ask Dr. Stevens if he took any pains to acquire the art of suggestion?

Dr. Stevens.—Never; except that I have read considerable about it of late years. I do not claim that that was any power of mine.

Dr. Grant.—The point I wanted to make was that it is claimed by some that people must have a special training—not only a medical training, but a special training in the science of hypnotism—to acquire the power of suggestion, but it is my belief that it exists in some people to an extraordinary degree. I had a talk with a man who has done quite a little in it, and I asked him that questien especially,—whether he considered it an art or a gift. He said that he could not say; he had known men to acquire a slight degree of training, while others seemed to be able to exert a great deal of influence without giving the subject much thought or study.

Dr. Fillebrown.—The very fact of its being possible for one person to hypnotize another without their knowledge is an additional reason for every one understanding it. If Dr. Stevens had understood his own case, all that trouble would have been averted.

A lady was in my chair last Saturday, and we were speaking of hypnotism, and she told me of a young lady who, when she came into her presence, would go into an hypnotic trance. She did not know at first that she caused it; but she found it out finally, and when the young lady again became hypnotized, she remarked that she could take her out of it, and she went up to her and made some reverse passes and she immediately recovered her usual conditions. Now, this power exists, and it is a great deal better that we understand it. Such a case would not be found often enough to become a factor to be taken into consideration, but that it is sometimes possible is one of the strongest reasons why we should understand such conditions; they are forced upon us without our knowledge or consent.

I wish to say one word in regard to the appreciation of it by the profession at large and the increase of interest in this matter. My first account of my experiences in the use of it were published in the *Dental Review.* I had that article with me at the meeting of the American Association in August, 1893, and it was suggested that it be read as a volunteer paper, and the feeling in regard to it then in a committee was that the subject was not relevant, and they were quite unwilling that it should come before the Association. Mark the change that has taken place since. The next year a paper on the same subject was made one of the four that was read before the general meeting of the World's Dental Congress. At the meeting of the American Dental Association in 1894 the subject was not formally considered, but I was solicited to give a clinical talk upon the subject.

Thirty or more dentists gathered and listened, and among them were members of the committee who refused to consider it two years before. This summer I was at Asbury Park attending the meeting of the Association. Nothing was said about suggestion in the meeting, but the same request was made for a clinic, with similar results. The appreciation of it and the practice of it is steadily extending knowledge of its use and of the benefits derived from its interviews from every quarter of the globe. We must not be behind in the adoption of an adjunct which is of undoubted merit.

President Smith.—If the members do not care to speak further on this subject, I will ask Dr. Grant to close the discussion.

Dr. Grant.—The paper excited some of the discussion which I hoped it would bring up, but I am still of the opinion that after all there is something more in the mere theory of repose and confidence in the operator than we are apt to give credit for, and that

this is sometimes mistaken for hypnotic suggestion, and I have not yet heard anything that changes my views of it. When we are masters of ourselves, we are, in a large measure, masters of our patients. I have been in practice now for twenty-five years, and I have this to say, that though I do not profess any power more than is possessed by any other man, I have yet to know of a patient leaving my office because I was unable to perform any operation that I undertook. It may have been good fortune to have had patients who could be handled without the aid of hypnotic suggestion; at any rate, all things considered, I think I have got along very well without attempting to use something whose effect is still uncertain and unknown.

William H. Potter, D.M.D.,
Editor American Academy of Dental Science.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A general meeting of the Institute was held on the evening of November 26, 1895, at the residence of Dr. George S. Allan, No. 51 West 37th Street, the President, Dr. Benjamin Lord, presiding.

The minutes of the last general meeting were read.

The President.—The notice of this meeting calls for communications on theory and practice, as our first business in order. If any of the gentlemen have anything to communicate we will be very happy to listen to them.

Dr. W. St. George Elliott.—Allow me to call your attention to a new operating-table heater that I have recently designed and made. The object aimed at is to heat the syringe-water, keep syringe itself warm, heat hot-air syringe, soften gutta-percha, and keep mouth-mirrors warm, so that moisture will not condense upon them.

The apparatus as you see is very simple, consisting of a copper plate two by six inches, on one side of which there is a Bunsen burner. Over this burner is a copper disk to catch the heat, which is then conveyed by the copper support to the plate below, and thence to the glass of water, and up the copper pedestal which supports the syringe. The mirrors rest on the copper plate. The gutta-percha is softened on a German silver disk, placed for a moment on the heated copper disk. The warm-air syringe is heated by being placed in the copper tube support to the heating disk. The flame of the Bunsen burner never jumps down, and the

blue flame only requires to be one-quarter inch in height. I have used both alcohol and kerosene for years, but they are liable to give out or burn out at a critical time. I see no objection to gas.

The President.—Are there any other communications on theory or practice? If not, I will say that I have some instruments here that have been spoken of occasionally during the past year, for removing tartar from the teeth, and which are thought to be an improvement on anything before used. They are simply the ordinary sickle instruments with the edges grooved. It recently occurred to me that the edges could be sharpened better by a very fine serrating file than with a file that leaves a smooth surface. I will pass the instruments around for examination. They are all made on the same principle, only of different thicknesses. In the very thin instruments the grooves should be made before the instrument is reduced to the desired thickness. The grooves, as may be seen, are in both edges, so that the pushing or pulling effort are equally effective. It is found that these instruments are excellent for finishing the margins of fillings, as well as for the removal of tartar, for which they are especially designed. The edge is such that it is sure to take hold of anything that we may wish to remove. Probably we have not had an instrument before with which we could be sure to discover and remove any foreign substance from the necks and roots of the teeth. I now take pleasure in introducing the essayist of the evening, Dr. Henry W. Gillett, of Newport, Rhode Island.

Dr. Gillett.—Mr. President and gentlemen, years ago, it seems to me, when I was a student and was accustomed to read the reports of the society meetings and doings of the profession in New York, I was greatly interested, and felt that they had reached the acme of the profession; and to-night I feel it to be a great honor to have reached a point myself where I have the privilege of addressing this Institute and of trying to say something that may be interesting, even if it be not entirely new. And I wish to say that, finding I had rather too much material to put into a paper to be given in one evening, I have taken the liberty of modifying the title as printed in the programme by adding the word living; making the title Electrical Osmosis in the Treatment of Living Dentine. In doing that I have simply thrown out, from lack of time to consider it, the process of bleaching dentine and of bleaching teeth generally, by the aid of the electrical current and solutions of bleaching agents.

(For Dr. Gillett's paper, see page 65.)

Dr. Gillett.—This instrument is manufactured by the Electro-Therapeutic Company, 32 East Twenty-third Street. I have here a graphite rod with wires attached, so that it may be put in the working circuit in place of the patient. By doing this I can show the method of turning in the current. By watching the milliampère metre-needle the regularity with which the current is added can be understood.

The President.—Gentlemen, this very interesting paper upon a most important subject is now before you for discussion.

DISCUSSION.

Dr. Geo. S. Allan.—Before we proceed to the general discussion of Dr. Gillett's paper, I hope the president will call upon Dr. Morton, who has given this subject a great deal of attention from a medical stand-point, and has succeeded in anæsthetizing the soft tissues, while, as far as I can understand, Dr. Gillett has not been successful in that direction. As dentists it is important for us to know how we can apply this treatment to the soft tissues with the same success that Dr. Gillett has achieved in treating the dentine.

The President.—We are very highly favored, indeed, in having Professor Morton with us this evening. Gentlemen, I present Professor W. J. Morton, M.D., of the Post-Graduate Medical School and Hospital of this city.

Dr. Morton.—I assure you that it gives me much pleasure to be with you to-night; the more so as I have had the privilege of listening to an admirable and well-presented paper. Dr. Gillett certainly has left very little for me to say, assuredly so in certain directions, even if I were to attempt to add to what he has said. There were several points in the paper that attracted my attention as he went along and that I tried to save in my mind for reference. One of the first thoughts that occurred to me was the extreme pleasure which it gave me to see this admirable and beautiful principle of electricity and medicine and its combinations brought into a practical use. I have long been familiar with these properties of the electric current. As long ago as 1879 I began to work on this subject of cataphoresis and had electrodes made, and I think that to-night we have had laid before us principles and practice which will not die in a lifetime. I recognize in it one culmination of an enormous amount of work in the way of experimentation that has been done, and also in practical operations which have not come out sufficiently in public. It remains for the dental profession to establish one practical use. And it is a curious fact that to the

dental profession really belongs the credit of procedures, both general and local, in their initiation, which have tended to annihilate pain, whether it is done with nitrous oxide gas, or with ether, or with chloroform, which was merely a later substitute for ether, and therefore marked no new era. All of these processes have had a practical beginning with dentists, and therefore, because of the starting of this method in this way, more attention may be attracted to it in medicine. Years ago I tried to produce cataphoric anæsthesia with chloroform, following the experiments of Adamkiewicz, of Vienna. I read also the experiments of Dr. B. W. Richardson and tried to repeat them, but have never been able to do so in a practical manner. I do not, therefore, think it is possible to make a reliable and practical cutaneous cataphoric anæsthesia with chloroform or ether. In 1890 I was much attracted by the experiments of Edison in introducing lithia salts in cases of gout by cataphoric action, for the purpose of removing gouty accretions in the joints, in which he had some success. From that time quite a number of experimenters took up cataphoric medication, but it has never been much used in general practice, either in medicine or dentistry. Still it has been effectually used in cases in private practice since 1890. In 1890, Dr. Peterson took up the subject, and you have heard in the paper what he did. He tried different alkaloids, aconitia, hydrochlorate, or muriate of cocaine, etc., with the success that has been described. The wonder to me is that in all this time cataphoresis has received so little attention, and that there has not been until recently any signs of progress made in cataphoric anæsthesia, or in general introduction of medicines into the system.

With regard to the point raised by Dr. Allan, as to the effect upon the soft tissues, I will say that my experience has been mainly upon those tissues. I have taken an electrode of one inch in diameter, and at other times a three-inch electrode, and, having placed it upon the skin, the negative pole placed at some indifferent point, have made the skin perfectly numb, turning it pale, and giving it a shrunken appearance, this and the anæsthesia enduring for fifteen to thirty minutes. No harm is done to the skin or the mucous membrane by the introduction of cocaine in that way. There are many difficulties in making these practical experiments upon the soft tissues which are not met with in the case of sensitive dentine. I think some of the failures in introducing medicine through the skin or the mucous membrane have been due to a non-recognition of the fact that in cataphoric conduction the surface to be affected must be very close to the metal. The intervening space between

the metallic plate and the skin has usually been filled with sponge; and the greater the distance thus intervening the less the cataphoric effect; the less the distance the greater the cataphoric effect. In order to get cataphoric anæsthesia of the skin, the metal should be placed almost upon the skin, with some thin substance holding the medicine between, such as a piece of blotting-paper, and then the cataphoric effect is quite pronounced. I think some of the failures that have been made in the past have been due to overlooking this fact. I saw to-day a couple of rubber cups where the metal conductor was about half an inch from the tissue. Certainly there would be little cataphoric effect in a case like that. In the application to dentine the platinum wire electrode, as good fortune would have it, comes unavoidably close to the tissue to be affected. A question that arises is, Does the effect upon soft tissues extend deeply? I am certain that it does. But I do not think there would be much chance of anæsthetizing the pulp or the locality of the apex of a tooth in such a way. To effect this latter when a cavity exists, I would make application from the cavity, and the drug is carried cataphorically through the pulp cavity to the end of the tooth and to the tissue there situated. By this same pathway, also, other medicines—say chloride of zinc, for example—may be carried to the end of the roots of the tooth and out through them to surrounding tissue, and thus afford a valuable means of introducing local remedies to diseased parts otherwise difficult to reach. There is a case reported by Dr. Peterson where the fifth nerve was affected and in which the relief from pain was continued for ten or twelve hours. This might be in favor of there being a deep effect, or it might be explained in another way.

An electrode to produce cocaine anæsthesia electrically for the extraction of teeth is familiar to many. A positive pole is placed upon the gums upon one side of the tooth and a negative pole upon the gums upon the other side. By no possibility could this electrode anæsthetize more than the gums on one side,—namely, that on the positive side,—and hence a painless tooth extraction would be by means of this electrode out of the question. The electrode must present a positive pole to *both* sides of the tooth. There is a certainty of getting a deep cocaine effect upon the gums in this way.

Iodide of potassium can be introduced through the skin, placing it upon a piece of blotting paper between the skin and the electrode, and in twenty or thirty minutes detect the iodine in the urine. To show how I have employed this method in medicine, I will say that

within the last year I have treated some cases that required the use of mercury, introducing it in this way instead of by the inunction method. Recently a woman came to us with suspicious indications of syphilis. She was referred to me at my electro-therapeutic clinic, and I was at first quite at a loss what to do, for in this clinic I use only electricity as an agency for cure. It occurred to me that I would treat the case by the introduction of mercury by means of electricity. I did so, using two foot-tubs, with corrosive sublimate in one, making it the positive pole, and salt and water in the other, making it the negative pole, and turning on thirty to forty milli-ampères. On the sixth day the patient was salivated, and we had all the evidences that the medicine had produced a constitutional effect.

I have nothing in particular to say about this apparatus presented that is called an "adapter." The word adapter I do not like to criticise, but I think our old friend rheostat has become familiar to us, and I like to hear things called by their right names. I have not seen the inside of that machine, and there may be some reason of which I am not aware for calling it an adapter, but it certainly is a most admirable rheostat. I spent an hour investigating it this afternoon. It is an arrangement that cuts down the flow of the current like a stop-cock in a water-pipe, and enables one to use, practically, the equivalent of one cell or four or twenty, as he likes, and to use very small fractions of current. The advantage of this is, that where cells having a voltage, say, for example, of two volts each, are used, a jump has to be made of two volts at a time; but with this rheostat the current is regulated so as to be perfectly smooth. Another thing: In talking of the strength of currents, the essayist uses the word volts to express the terms of measurement of the gradation of current employed in making successive applications. Generally, when talking of currents, ampères, or fractions of ampères are the terms employed. One can talk about volts if he pleases, and it may in one sense be fairly correct, but the terms ampère and milliampère are more correct. It is equivalent, in using the word volt, to say, I use one, or five, or ten cells, etc.; and that is not the real question. The question is, How much strength of current is used,—that is, how many ampères or fractions of an ampère.

I think, gentlemen, that is all I have to say at present. If, later on, I shall be able to give any information on the subject, I shall be glad to do so. Dr. Gillett has collected a great deal of information on this question, and it would be almost superfluous, certainly

as to its application in dentistry, for me to try to add to it. Not that electrical anæsthesia or "cataphoresis" is new. We all know that tissues can be actually benumbed by means of an electro-cocaine application; but Dr. Gillett has demonstrated that sensitive dentine can be benumbed, and that is a very happy thing to do. I think the credit is due to the people who do the thing, not to those who merely theorize, and that one honest demonstration is worth about a ton of theory, and such demonstrations we have had, in spite of the scepticism of a great many people. The facts that Dr. Gillett has brought forward to-night will live a long time.

Dr. Howe.—I have been very much interested in Dr. Gillett's presentation of this subject, because I have made some similar experiments, and I am glad to endorse what he has said. But I think that Dr. Gillett has not given due credit to Dr. Westlake, who published in 1892 the results of experiments which he had made, and in which he accomplished the same results. His paper was read before the Dental Society of the State of New York, and was published in 1892. I experimented in this line a little more than a year ago. I obtained some information from Dr. Peterson, who has been so largely quoted from, and began experiments to produce anæsthesia of the tooth-structure. In two or three of the first cases the cavities were rather inaccessible to electrodes, and I did exactly what Dr. Gillett found to be rather impracticable. I produced anæsthesia of the dentine by applying the electrodes to the gum tissue on each side of the tooth-roots, as nearly opposite the apices of the roots as possible. A solution of cocaine was placed on the sponge in one of these small soft-rubber cups and a salt-water solution in the other. The first application that I made was successful in twelve minutes in producing complete anæsthesia of the dentine in an extremely sensitive cavity. This is the electrode that I used in that and several other cases since. You will perceive that it is home-made and rather crude. I never knew of any irritation of the mucous membrane, or any discomfort following such applications. In my later applications of the electric current for its cataphoric effects, I have applied the anode to cotton, with a solution of cocaine in the cavity, and have generally put the cathode in the patient's hands. This method has taken, I think, rather more time than the former one of sending a short circuit through from one side of the gum to the other across the roots of the tooth. I will mention in connection with this subject that this experimentation suggested to me the possibility of causing increased circulation and nutrition in the gums by applications of the faradic current. In

experiments of this kind I have used my finger for the negative electrode, applying it to the gums, and have placed the positive in the patient's hand. My finger has been insulated by covering it with a soft-rubber finger-stall, having a hole cut in it near the end, corresponding in location to the palmar surface. These applications of the faradic current have been followed by a very satisfactory stimulation of nutrition, in two or three cases, in which the patients were willing to follow up the treatment. But in resuming the special subject, I would say that Dr. Gillett's experience, that the consumption of time in anæsthetizing dentine by cataphoresis was not so great as to make him feel that he was not compensated, has not exactly coincided with mine. I must confess that I did feel after a while that I was getting into deep water, because I was consuming so much time, and not accomplishing enough to pay for the loss thus incurred. This would not be so, except for the demands of patients that their work be done painlessly, whether in the operator's judgment the severity of the operation requires anæsthesia or not. The question of time has caused me to use cataphoresis very little of late. To-day, however, I happened to have a patient in the chair who had a cavity that was so sensitive that I could do nothing with it, and I applied the current for about twelve minutes, with a solution of cocaine in the cavity, just as Dr. Gillett has described, and it reduced the sensitiveness very much indeed; not completely; but, if I had persisted longer, the anæsthesia would have been complete; there is no question, gentlemen, about that. There has been suggested to my mind a doubt as to the desirability of using the Edison current for these operations, notwithstanding the interposition of a rheostat. There is a possibility of a two-thousand-volt wire touching the wires of the system that we are connected with; perhaps it might occur in a burning building, or in some unexpected displacement by other means; and such possibilities ought not to be ignored. There would seem to be no need of using the street current, for I am informed by Dr. Peterson, with whom I have talked within a day or two, that the chloride of silver dry-cell battery is entirely satisfactory and can be used for several years without renewal.

Dr. C. A. Woodward.—I called at Dr. Gillett's office in Newport at a time when he had been applying this current for some minutes to a patient's tooth, and after speaking with me he returned to the patient and began excavating the cavity. The patient winced, and said she was suffering some pain, but not as much as she had before the application. Dr. Gillett repeated the application, and in the

course of about five minutes she declared there was no feeling whatever from the cutting, which was proceeded with very vigorously.

Dr. M. L. Rhein.—I made a special visit to Newport to see Dr. Gillett, and I saw him use this method on a patient very successfully, although I don't suppose it was a very good case, because it was a woman somewhat advanced in life, with the class of teeth that are not as a rule very sensitive; but to a careful observer there was absolutely no question of the complete anæsthesia of the cavity on which he was working. He not only demonstrated it to me in that way, but he made an actual demonstration of the method on one of my own teeth. Unfortunately for the object in view, I had no cavity in any tooth in which to demonstrate the method, but I had a well marked erosion on a superior central incisor that at certain times becomes more or less sensitive. The rubber dam was adjusted over this tooth, and I could distinctly feel the application of the electricity in connection with the solution of cocaine that was used. It was, however, not painful, and at the expiration of the time allotted by Dr. Gillett there was absolutely no sensation on the surface of the tooth, though before he made the application, I felt very unpleasantly the passing of a burnisher over its surface. One of the points which he brought up in the paper might be of interest in connection with my observation of the condition of my tooth after I left his office. For two days it had that well-known numb-like feeling. This experience of mine is very much at variance with that of others as to the speedy loss of the anæsthetic effect. My own view of the matter is that the duration of the anæsthetic effect is more or less dependent on the density of the tooth to which it is applied. After this peculiar feeling had passed away, a condition of hyperæsthesia ensued, which lasted fully forty-eight hours, and for that length of time it was extremely uncomfortable in the mouth. I happened to meet Professor Morton in connection with some little experiments in a similar direction, and mentioning this to him he corroborated my own observation of the fact that we are very apt to get a condition of hyperæsthesia following the condition of anæsthesia. It is an interesting point for us to consider, because we are apt to meet with it in the use of this method, and I myself would be pleased to hear from Dr. Gillett what his experiences have been with regard to any subsequent hyperæsthesia. The subject of local anæsthesia is one that has interested me personally for a number of years, and I have had considerable success in certain forms of cavities. Some of the gentle-

men present may recollect an article of mine on the use of intense cold for that purpose, a temperature of seventy degrees below zero applied for five seconds by means of the chloride of methyl. In my experience in the use of intense cold in a large number of cases there ensued this condition of hyperæsthesia that I have spoken of. I think the experiences of Dr. Gillett on this point would be very instructive.

Dr. Gillett.—With regard to the point that Dr. Rhein raises, I have had many cases where the application was much more prolonged, and with deeper effects obtained, without noting a numbness of the teeth for more than a few hours. In my own tooth I did not note anything of that kind. I do not remember whether my mind was acutely attentive to that point or not. Nor did I have any hyperæsthesia afterwards. I have been using this method regularly in my practice since March, and I have not seen any case where there was hyperæsthesia that I was able to distinguish from the ordinary hyperæsthesia that might come after filling a sensitive tooth.

Dr. Rhein.—I want to say that it was not in my experience a bad condition at all, or one that could have exerted a serious effect on the tooth; it was merely an uncomfortable sensation, it might even have been called an unpleasant feeling, by which my attention was constantly attracted to that particular tooth. But the interesting point of that is that Dr. Gillett may have attributed to the operation on the tooth what was merely the after-effect of the anæsthesia. Perhaps Dr. Howe or Professor Morton may be able to give us some information obtained in the course of their observations on that point.

Dr. Morton.—In local anæsthesia there is always a reaction to a more sensitive condition, or hyperæsthesia, which will last about an hour.

Dr. Allan.—Has Dr. Morton employed this cataphoric method in the mouth at all?

Dr. Morton.—Not on the dentine of the teeth.

Dr. Allan.—On the soft tissues?

Dr. Morton.—Yes.

Dr. Allan.—Using an apparatus similar to Dr. Gillett's?

Dr. Morton.—I use a common rheostat.

Dr. Allan.—May I ask if the whole system of procedure was similar to his?

Dr. Morton.—Identical. It would not vary so far as I have understood him and without further knowledge of his technique.

Dr. Allan.—How does Dr. Morton account for the failure that Dr. Gillett has had in applying cocaine through the gum?

Dr. Morton.—I don't understand that. Dr. Gillett says he did make the gums numb. What I understood him to say was that he did not reach the pulp cavities of the teeth, which are a long way from the gum. The effect did not go deep enough; and I should say he never could get cocaine to go deep enough through the gums to affect the pulp of a tooth at the root, because I think it is too far away and the circulation is too active. One of my own experiments in 1890, when I made some contributions to the subject, was to place a ring around the part I wished to anæthetize, and with pressure upon it cut off the circulation of the skin so that there was no current of blood flowing in that part. In that way the cocaine went into the tissue and was not washed off by the general circulation, and the effect produced was much greater than otherwise. That effect has been repeated, and that process is in vogue at present to a certain extent. In the case of the pulp in the root of a tooth, it is quite distant from the point of application, and what little cocaine gets there may be washed along and away in the blood-stream. But I do not understand that the gums cannot be made numb. If the electrode is properly constructed they certainly can be. I have made both the skin and the gums absolutely pale and anæsthetic with cocaine. But, better than by rings and other means of circumscribing circulation by pressure, chemical agencies may be used to restrict the action of cocaine to local areas of territory.

Dr. Wendell C. Phillips.—I regret very much that another engagement kept me away from this meeting until Dr. Gillett had finished the reading of his paper, but I have heard enough of the discussion, and I am familiar enough with the work that Dr. Gillett has been doing to lead me to surmise the ground that he has covered to-night. I became exceedingly interested in the subject of cataphoresis in the obtunding of sensitive dentine, partly from the fact that I am interested in the general subject of electricity apart from this particular application of it, but mainly that it was during a visit at my office where I was explaining some experiments I had been making with cataphoresis in my throat and ear work, that Dr. Gillett suggested that it might be used in obtunding sensitive dentine, and the first experiment followed, and I have watched his work with a great deal of interest from that time up to the present. I remember that the first experiment, which was made under rather unfavorable circumstances with the Edison con-

troller, which is not adapted to this work upon the teeth, was so successful that I said to Dr. Gillett that cocaine cataphoresis is destined to revolutionize dentistry; and I believe that prophecy is about to be realized. I must say, in answer to one or two questions that have been raised to-night, that my judgment is, if electricity is to be used at all, the sooner we master the working of the street current and use it, the better.

Use the current that is always present, and that has a certain known voltage, and master the necessary information to be able to handle that current. It is the most convenient and it is always under control if one has a proper controller with which to use it. After some years experience and work in this line I have thrown out, with one exception, every electrical apparatus not used with the street current; that exception is the electric cautery storage battery. It is but fair to say that in recent years there has been great improvement in these various appliances, but the street current gives most satisfaction, but one must use the other forms when the street current cannot be obtained. With regard to the question raised by Dr. Howe in connection with the use of the Edison current and the possibility of a high tension current coming in contact with the wire in use, I don't think any intelligent electrician who has made a study of this subject, would manufacture an adapter without providing for this contingency. It has been overcome in the controller seen here to-night, for it has a little device that would immediately burn out and shut off the current.

Now as to the question of cocaine and its action: I have only had experience in the use of cocaine in my practice in the treatment of diseases of the nose, throat, and ear. We use great care to prevent the physiological effects of the drug, because there are certain people who are peculiarly sensitive to its action. It not infrequently happens that a very small amount of a very weak solution will throw a patient into a state bordering upon collapse. We always strive to localize its application as much as possible, and not allow it to get into the post-pharynx more than possibly can be avoided, and one should always be supplied with cardiac stimulants. Patients, however, recover in an hour or so. Probably the best way to use cocaine in dentistry is to introduce it on a pledget of cotton in the cavity of the tooth, not allowing it to come in contact with the gums, for if it does, physiological effects in occasional cases may follow and cause some alarm. It stands to reason that it will be almost impossible to force enough of the cocaine into the

general circulation through the dentine of the tooth to produce any physiological effect whatever. I don't know whether the method that Dr. Howe used is better than Dr. Gillett's, but my opinion is that Dr. Gillett's method is the better one, because it sends the cocaine through the dentine in the cavity, and it goes where it is wanted. It also has the other advantage that it will not be apt to produce any physiological effect, and that would seem to be very much in favor of Dr. Gillett's method. If Dr. Howe will allow me to make a criticism of his electrode, it is that he uses a soft rubber mouth-piece, and I doubt very much whether it can be used in the mouth without objection in the matter of cleanliness. I should suppose that the method used by Dr. Gillett would be much cleaner in its application, for the negative electrode is outside the mouth, and the positive electrode can be made of some smooth metal, such as platinum. Platinum can be rendered absolutely aseptic before it is placed in a patient's mouth again. Some of us have learned a lesson by experience, and I am led more and more to feel the necessity of having hands, instruments, apparatus, cuspidors, etc., strictly aseptic. People are getting educated upon this question of cleanliness to such an extent that they demand that we have every instrument aseptic; and I don't blame them very much, because there are dangers that we little realize of carrying disease to these delicate tissues.

Now, as to the use of this particular apparatus known as the fractional volt selecter, and manufactured by the Electro-Therapeutic Company, I look forward to its use in my practice, because of the exact control it gives of the voltage and current. In that instrument we have one by which we can turn on a fraction of a volt of current, and know exactly what we are using. Since I began to make some experiments in cataphoresis, I have up to this time used three or four different electrodes. One is a zinc electrode, another a copper electrode. I have used solutions of copper and zinc, and I cannot say that I have noted any effects from them. I have used most effectually the pyrozone in ether solution twenty-five per cent., to destroy germs in the crypts of the tonsils, and in the posterior and superior pharynx. I have been told, and it has been demonstrated two or three times in my presence, that with this volt-selecter the current can be applied painlessly, and without stopping to lower the voltage the electrode can be removed without giving pain. In this principle of the apparatus, it seems to me, lies its greatest usefulness, for it must be remembered that, as ordinarily used, the galvanic current causes pain when applied to

a tooth, and it would be folly to attempt to relieve one painful condition by substituting another.

Dr. Howe.—I think Dr. Phillips misunderstood somewhat my use of that electrode. It was purely experimental, and is not now in use. The experiments were carried on during about a month. The electrode is made so that the rubber cups come off, and the sponges are easily renewed, after each use, but if I had continued to use it in practice, it would, of course, have been necessary to have it made so as to be more readily cleansed. I would like to say, Mr. President, that I infer from something that has been said, that perhaps it was not understood that anæsthesia of the dentine was produced in my experiments, in as short or a shorter time by passing the current across the roots of the tooth, through the gum, as it was when the positive electrode was applied in the cavity. Of course, there may be reasons why that is not the best way, but it is a practicable method, and I think would sometimes be found to be the easiest way of accomplishing the desired result.

Dr. Phillips.—There is one question I wish to speak about if I may be allowed, and that is the length of time that cocaine has any effect upon the tissues. I think Dr. Morton partially covered that ground. The effect of cocaine upon the tissues and membranes of the nose is to contract the arterioles. The anæsthesia lasts a varying time in different cases, according to the amount used, and partly depending upon the patient himself, his resistance to the effect. After a time there is a reaction resulting in a decided relaxation of the arterioles and hyperæmia of the tissue. This effect lasts an hour or two only. The effect of cocaine upon the tissues would be entirely gone within a period of from one to three hours. Future experiments may demonstrate the length of time which cocaine anæsthesia will effect the dentine.

Dr. Allan.—Dr. Phillips is quite right in regard to the use of the electric current from the street wires. It is something definite and certain. In the use of the current for dental purposes I have a rheostat that I have used a few weeks, which cuts the current down for use in the mouth-lamp perfectly. The Edison Company have promised me one that will work the cautery as soon as it is completed. When they have succeeded in getting a finished instrument we will banish the battery. I have a storage battery, and it has been an unmitigated nuisance ever since I have had it. I don't quite understand why we do not have electrolysis as well as cataphoresis in the use of electricity and cocaine upon the tissues of the mouth. Electrolysis is a very different action from cataphoresis.

Electrolysis in the use of cocaine, as Dr. Gillett proposes, would mean the decomposition of the cocaine, not the forcing of it directly into the substance of the tooth. I don't quite understand that. But to us dentists this paper of Dr. Gillett's has another point of interest. It has been a moot question with us as to what was the exact nature of the contents of the dentinal tubules. No histological preparations have demonstrated the exact nature of the contents of the tubuli. Now, if this series of experiments proves anything, it does prove that there must be nerve-filaments in the dentinal tubules, otherwise it is impossible to account for this action of the cocaine.

Dr. Jackson.—I have been searching in my mind for some reason for the loss of the soft tissue that Dr. Gillett has spoken of, when the electric current is applied with cocaine to the gum. I would like to ask if most of the cocaine solutions in the market do not have an acid reaction, and, if the solution is acid, would not that account for the sloughing of the gum by its introduction into the tissues? Does Dr. Morton think that could be so?

Dr. Morton.—Just what the action of the solution would be, I really do not know, but it would scarcely cause sloughing of the gum. It was probably the strength of the current that did it, for if that is very strong, an electrolytic effect is produced. We have to avoid this over-powerful electrolytic effect, and use only sufficient current strength to produce penetration of the medicine without causing any injury to the tissue. This can easily be done.

Dr. Jackson.—I was trying to determine whether the presence of the acid would not account for the loss of gum-tissue. I have tested several solutions, and invariably found acid present.

Dr. Gillett.—Dr. Phillips says that a cocaine solution should be neutral. I have tested several solutions and found them slightly acid.

Dr. William J. Evans.—With regard to the acidity of cocaine solutions, I may say that very frequently cocaine solutions are prepared with salicylic or boric acid, for the purpose of keeping the solutions aseptic. The solution of anhydrous crystals of hydrochlorate of cocaine is neutral. It ought to be taken into account, however, that acid collects, out of decomposed tissue, at the positive pole, and alkalies at the negative pole during the application of a galvanic current.

I would like to ask Dr. Gillett a question in connection with this volt selecter. As I understand electricity, the first knowledge

of it is in connection with volts, the next in connection with resistance, or ohms, the next with the measurement of the current in ampères or milliampères, and the next in the measurement of the quantity of the current passing in a definite length of time. Now, I understand that electricity is very nearly related to heat, and we have a unique device here, in this fractional volt-selecter, which presents a rather amusing feature to me. We have something which cuts one hundred and ten volts down to one volt, and apparently there is something done with the electricity, which, if it is heat, is not hot. I would like a little explanation on that point.

Dr. Gillett.—I think, gentlemen, that the question carries me rather deeper into practical electricity than I can safely venture. Very likely Dr. Morton will be able to suggest a better answer than I can. I will say that in the practical working of this apparatus it does not go beyond the point of being fairly warm. In five, or perhaps ten, minutes, it becomes as warm as it would be in half an hour or an hour. If I understand rightly the mechanical details of its construction, it is made in this size that it may not collect heat; otherwise it could be made considerably smaller. These holes near the ends of the cylinder are put there for the purpose of allowing the heat to diffuse itself in the surrounding air, and with the aid of that diffusion of heat it does not become sufficiently hot to be objectionable in practical use.

There were several points raised in the discussion upon which I might say a word. First, I wish to express my appreciation of the very kind treatment which has been accorded me this evening. Regarding one point that Dr. Morton brought out, I would say that it would seem that one of the reasons for success in the application of this process to the dentine is also a reason why we have not succeeded in getting ordinary absorption or osmosis in dentine. The absence of active circulation in the dentine enables us to localize and intensify the effect.

The rubber cups that Dr. Morton speaks of are very nearly like those that Dr. Howe has shown. Dr. Morton took some exception to my use of the word volt or voltage, when describing the current. It is possible that Dr. Morton fails to appreciate the fact that in the use of the current through dentine it is almost impossible with the Kennelly milliampère meter to ascertain definitely what current we are using, because it is so small. A very large percentage of successful cases have been cases where the quantity of the current registered on a milliampère meter like this one has been below one

milli, and in many successful cases there has been absolutely no current recorded on the milliampère meter.

Dr. Morton.—Then it is a bad instrument.

Dr. Gillett.—The fact is that a record of that quantity cannot be obtained.

Dr. Morton.—Then get another instrument. The reason Dr. Gillett gives shows it to be a very poor one.

Dr. Gillett.—I am glad to learn that there is a better milliampère meter. I have felt the need of it. Not having it, and the volt index of the adapter being conveniently at hand, I have fallen back upon an approximate statement of voltage as the best means of making a comparison. With regard to what Dr. Howe said, I have no desire to take away any credit that is due to others. My remarks concerning Dr. Westlake should be taken only as my personal estimate from my understanding of the matter. I may be entirely wrong in my estimate of what he has done. At present I think I am right. In regard to the matter of time consumed, I find in many cases that I save time, because I can work so much more rapidly after I have the sensitiveness of the tooth under control. Oftentimes the assistant can as well get the tooth ready to work upon as the operator himself. As to the use of batteries, it seems to me only a question of personal choice. I get satisfaction from the use of the Edison current, and I believe this apparatus protects me and my patient. I have found that this apparatus is very much less painful than one in which the rheostat is placed in different relations. The case quoted of the boy who went to sleep under it is a good illustration of the painlessness of the process. With regard to the question of acid reaction that was raised, one reason why I selected chloride of sodium for my experiments was on the assumption that, if any of the anæsthetizing effect was due to an acid condition at the positive pole, I would get about the same conditions from chloride of sodium and the muriate of cocaine. With the sodium chloride solutions I got no results, except irritation and pain. If these results were obtained by electrolysis and the formation of hydrochloric acid, as suggested, we ought to have the same results from the electrolysis of chloride of sodium, as there would be free chlorine and free hydrogen from the splitting up of the salt and the water, and consequently hydrochloric acid as a product. As a matter of fact, the current used is so small in quantity that the electrolysis is reduced to a minimum and need not be considered.

Dr. Woodward.—Mr. President, I move a vote of thanks of this Institute to Dr. Gillett for the exceedingly able and interesting

paper that he has given us to-night; also to Professor Morton and Dr. Phillips for their kindness in coming out this very stormy evening to assist us in discussing this question.

Dr. Woodward's motion was carried unanimously.

Adjourned.

S. E. Davenport, D.D.S., M.D.S.,
Editor The New York Institute of Stomatology.

Editorial.

THE WAR ON THE DENTAL COLLEGES.

When the attack on dental colleges was made in the American Dental Association at Asbury Park, it was not generally considered a remarkable or even a novel outbreak of illogical utterances, but it has evidently stirred up the college mind as never before, and we have had line upon line given us to read in which there is intermingled much truth and error. The question may be asked, "Why were not some of these things said at the meeting?" There was but one reply made to the charges when the entire body of college men present should have claimed the floor, and demonstrated by force of numbers and weight of intellect that they repudiated the defamatory remarks. Silence seemed to give an assent to these, and it was subsequently openly stated that the colleges could not and dared not deny the imputations cast upon their work.

From present indications we are on the eve of a sharply-contested war between collegemen and non-collegemen, the latter being aided by some, we trust not all, of the members of the board of examiners of the several States. There has been from the very inception of these boards a feeling of antagonism between them and the faculties, and the reason for this has been plain to the intelligent observer of events.

The laws formulated and adopted in the various States were based, we are willing to believe, upon an honest desire to improve the standing of the profession. While this object cannot, in the opinion of many, be attained by law, it is regarded by others as the best method to secure improvement. If the history of the world had been intelligently read, it would have been observed that

statutes never made a higher moral or intellectual life, but simply remained a repressive force to reduce the power of evil. It is too late now to argue for the good or ill results of State laws governing dentistry. They are here and will, it is presumed, remain an active power in professional work. It is to be deplored that some members of these boards should seek to open, or rather continue, a controversy that had, in a measure, quieted down.

In the present number will be found a paper prepared by a member of the New Jersey Board. It is admitted to our pages upon the established rule of the journal to hear all sides of a question, although it does not seem to be written in the spirit of conciliation so necessary at this period of the controversy, indeed, it seems to go to the profession with all the force of a declaration of war made by the writer against the dental colleges of the United States.

It must be apparent, in reading this paper, that the self-laudatory spirit is not one of the attributes lacking in one member of the New Jersey State Board. A few sentences are quoted in illustration of this. "A *résumé* of the question in regard to the influence of examining boards on dental education would necessarily become a history of the advance of modern dentistry. . . . I think . . . the colleges are not working entirely from a philanthropic stand-point, *while the examining boards are*. . . . Any one who has been an unprejudiced observer . . . must admit that the boards have . . . been the means of providing for the *student a higher and better education*."

It may not be considered out of place to remark in reply to these quotations that dental colleges were never organized upon a philanthropic basis, nor is it generally understood that the motives which influence the members of State boards are wholly altruistic in character. The one represents an effort to educate to a higher standard with all the means possible at command, recognizing at the same time that the work is a business, and must be conducted according to business principles or failure will result. As a certain portion of good inheres in all business relations, so in this, but it must not be permitted to overmaster the law of self-preservation. The evidences of philanthropic virtue in State boards has not as yet assumed obtrusive proportions, but the profession can patiently wait for the evidence that should be forthcoming as the controversy extends. It is in evidence that the members of these organizations are not paid more than their expenses and frequently not even that, but they have what is dearer to a certain class of men, power.

All members of these boards are not thus influenced; indeed, we know that the good of the profession is the sole motive which actuates many, perhaps a majority, but whether it is with all may be seriously questioned.

The following advice, quoted from Dr. Crouse, would be excellent if it were at all new, but as it is not we repeat it here simply to answer an unjust criticism. "Now as to the student's mechanical adaptability, . . . if he hasn't it in his fingers . . . he will never make a dentist, and of this fact the colleges have, as yet, taken no notice. . . . Therefore, the first six weeks of the college course should be spent in finding out who are properly qualified by nature, as well as by training, to be dentists."

The ignorance of college work displayed in this quotation is most remarkable. It is hardly to be questioned but that every effort has been made for years, during the first session or Freshman year, to examine critically into the inclination and ability of each separate student. It is a difficult and not always a pleasant task, but yet a duty each Dean must perform. In this effort to weed out the incapables, we have no doubt but that each Dean has discovered a decided opposition from the individual as well as parents and guardians. It is rarely that good advice of this character will be received in the spirit in which it is given. To expel a man because his abilities are supposed not to be of the highest order has not yet become a law of colleges, and we hope it may never be so long as the possibilities of development are without limitations.

We cannot follow this unfair and untruthful denunciation of college work. It would be waste of time to undertake to meet in detail charges based wholly on assumptions. No one can truthfully say of colleges as a whole that they are guilty of this or that wrong, or deserve commendation for this or that good accomplished. A very close and very intimate relation is needed for this, not obtainable even by those who are in daily connection with college work. Hence no member of one college would be found daring enough to assert any ill of a sister institution, but in proportion to the ignorance of the man will be his readiness to traduce the work.

The objection to State boards does not apply to these as servants of the State under a recognized law, but to the fact that the colleges have not confidence in them as at present constituted. It would seem not difficult to understand why men who devote their time and have exhausted their best abilities in instruction, have not much patience with men appointed as examiners by a governor

through political favoritism. Ability to examine, as well as to teach, is acquired only by long years of experience, superadded to a thorough knowledge of the subject, and cannot be attained by a few hours study of "Questions and answers." It may be said that lack of knowledge must be exceptional with members of examining boards. We do not care to believe it true of the majority, but it is certainly of some, else why this query in substance and not singular in the experience of educators,—"Can't you give me a series of questions, I have just been appointed on the State board?" This kind of thing destroys confidence.

Our medical friends seem to be in no better shape. The medical board in Pennsylvania adopts the same tactics as the writer in the present number in quoting from examination papers, a proceeding not in good taste and an undeserved reflection on the schools generally.

A correspondent from Paris in one of our prominent medical journals thus ventilates his opinion of State boards. "Nine-tenths of the State Examining Boards in the United States could not answer one-tenth of the examination questions they ask. It is a source of amazement that the members of the true profession in any country, especially in the United States, should endure legislation that enchains them as to the bounds and limits in which to exhibit their professional skill. . . . A profession forced to defend itself by protection can only acknowledge its weakness." These are strong words, and while we do not endorse them entirely, there is something in the ideas enumerated worthy of reflection.

The remedy for all this unpleasant friction is to accept the laws as we have them until changed or repealed. See that graduates of the best schools are placed on the examining boards, and, as a precautionary measure, consult the records of the colleges as to the standing of candidates for appointment, but above all, take the selection of men out of the hands of the governors of the several States. This can only be done by legislative action, but it should be the first move in the direction of reform.

Honest criticism, based on absolute knowledge of college work, should be encouraged, but it must be conducted in a spirit of justice to all concerned. It should be remembered that colleges to be successful must be conducted upon a well-arranged system, and it is obligatory that this has for its foundation the instruction of the students, by any and all means attainable within honorable lines. In accomplishing this, if good can be done to a large class of patients it is well, and every right-thinking mind should rejoice, but it is not

the purpose for which colleges were established, nor will it be possible to force them to consider it by any amount of ill-advised and open denunciation.

EXPLANATION.

We regret that, through an error in the make-up of the January number, the resolutions of the Boston Society for Dental Improvement failed to accompany the picture of Professor Chandler. In justice to that organization, the picture is repeated and placed in its proper connection with the resolutions.

Bibliography.

The Diseases of Children's Teeth: Their Prevention and Treatment. A Manual for Medical Practitioners and Students. By R. Denison Pedley, M.R.C.S., L.D.S. (Eng.), F.R.C.S. (Edin.), Dental Surgeon to the Evelina Hospital for Sick Children, Southwark, London. With numerous illustrations. I. P. Segg & Co., London; in America, S. S. White Dental Manufacturing Company, Philadelphia, 1895.

This volume of two hundred and sixty-one pages is prepared by the author for the purpose of aiding the isolated practitioner in medicine, who, "settling down in the country where the area of practice is wide and the opportunities of obtaining skilled dental assistance are few," finds the necessity for just such advice as is contained in this book.

The opening chapter is occupied very properly with the consideration of the structure of the teeth. The tissues are described briefly, but with sufficient fulness to meet the purpose intended by the author.

In the next chapter, on "The Eruption of the Teeth," the author explains, rather too briefly, the result of the reflex disturbances observed, which change so frequently from a "physiological into a pathological process. At this period the edge of the open, forming root will be in intimate relation with the pulp-tissue, and if there is pressure by resisting gum (*vis a fronte*), the irritation

may give rise to relatively the same degree of stimulus received in the case of a large exposure of pulp in an adult tooth affected by caries."

This practically answers the query, "Why lance teeth during dentition?" but as the author hopes to impress medical men, it seems to the writer he should have made this vital point more impressive, and extended it to the lesions produced by pressure upon the undeveloped region of pulp-tissue. It would have been instructive to have shown where and by what means new pathological conditions are produced.

The subsequent chapters on Caries, Pulpitis, Periodontitis are well written, and should accomplish the desired aim of instructing those needing them.

The next chapter, covering sixty-four pages, on "Irregularities of Structure," might have been condensed without materially lessening its value. It is not to be presumed that medical men will take the time necessary to study irregularities, a very difficult portion of the dentist's work,—indeed, so complicated that the treatment is gradually falling into the hands of specialists. Exception must be taken to the advice given on page 117, where the author says, "The remedy for overcrowding is judicious and timely extraction. This should be carried out between the ages of twelve and sixteen years. . . . The movements which take place in the teeth during mastication (always on the lines of least resistance) will insure the rapid filling up of gaps thus made. To remove one alone is not, however, sufficient. On referring to Fig. 28 of a normal articulation in permanent teeth, it will be seen that the bicuspids and molars interlock when the jaws are closed. The effect of removing one of these teeth alone—an upper bicuspid or molar tooth, for instance—is that the lower teeth effectually prevent the tooth on either side of the space above from approaching one another, and a gap remains. Should, however, the tooth above and its principal opponent below (as in the case of the first permanent molars) be removed, within a year's time the teeth on that side of the mouth will all have moved, the back teeth forward and perhaps the front teeth backward, *leaving an interval between each tooth.*"

This advice is directly in the line of the old teaching so firmly fastened upon the practice of forty years ago, now, however, happily relegated in this country to the obsolete methods as part of the history of dentistry. This is not the place to argue this question with the author, but it is very safe to dogmatically affirm that

such methods of regulating teeth invariably produce irregularities difficult, if not impossible, to correct.

The chapter on "Oral Hygiene" the reviewer regards as the most valuable in the book. The facts therein contained should have a wider circulation than, it is feared, will be possible in book form. The author gives some of the results of the investigation of the teeth of children in parochial schools, industrial homes, and national schools made by Mr. Fisher, of Dundee, and Dr. Cunningham, of Cambridge. These reports make interesting reading. One paragraph is quoted,—"Four hundred and fifty-eight girls from pauper schools of the metropolis *alone* entered domestic service in one year. Five-sixths of that number had never known the use of a tooth-brush. . . . Referring . . . to the table of figures, it will be seen that 2972 children had among them 10,795 carious teeth."

The balance of the volume is included under the head of "Treatment," comprising treatment of toothache, stopping or filling, extraction, injuries of the teeth, and, finally, tartar and its removal.

While this book does not, as a whole, reach the standard demanded by a dental practitioner, it still is worthy an important place in his library, but it derives its greatest value as an aid in post-graduate instruction to medical practitioners.

The arrangement and work of the publisher are exceptionally good.

Obituary.

THOMAS H. CHANDLER—RESOLUTIONS OF RESPECT.

The Boston Society for Dental Improvement have adopted the following resolutions of respect in behalf of the late Thomas H. Chandler, A.M., LL.B., M.D., D.M.D.:

Resolved, That in the death of Dr. Thomas H. Chandler, for twenty-one years the honored dean of the Harvard Dental School, the dental profession has lost one of its brightest ornaments and humanity one of its truest friends.

Resolved, That the Boston Society for Dental Improvement, recognizing our great loss, desire to place upon record our high appreciation of him as a man and a professional brother. He was a man of noble mien, with a character a fit complement of his person. His spotless character contained no trace of sordid ambition or self-laudation. Genuine and true, he had no sympathy with shams or any of the petty artifices of life. Gifted by nature, he adorned

DR. THOMAS H. CHANDLER.

those gifts with a most liberal education, and under the impulse of his love for sound learning he explored many fields of knowledge beyond the reach of a less cultivated mind. Painstaking and accurate in his investigations and conclusions, thorough and progressive in his profession, he became a safe guide to all who sought his counsel. Kind, generous, and sympathetic, he easily won the highest esteem of all lovers of true nobility. His very presence was a benediction; therefore be it

Resolved, That we will cherish his memory with the profoundest respect, and that under the inspiration of his noble example will strive to uplift the profession which he did so much to enrich.

Resolved, That we extend to his family our most heart-felt sympathy in this their great affliction, and would beg to remind them that, "although our heavenly Father's ways are often passed finding out," yet we know that "He doeth all things well."

Resolved, That a copy of these resolutions be forwarded to his family, and that they be placed upon our records.

Boston, December 3, 1895.

JOHN DE HAVEN WHITE, M.D., D.D.S.

The announcement of the death of Dr. White in our last number was regretfully very brief for reasons then stated.

Dr. J. D. White was born in Lancaster, Pa., in 1815, and at the age of seven became an orphan and was bound out to a farmer. This was his humble beginning in a long struggle with the world. His educational advantages were very limited during this apprenticeship as a tiller of the soil.

In 1836 he was found in Philadelphia working at Jefferson College for a diploma in medicine. During his studies there he took private lessons in practical dentistry, the only method available at the time.

His practice, subsequent to graduation, was entirely confined to dentistry. Part of his early career was spent in Middletown, Pa., where be became the dentist of Senator Simon Cameron, and this laid the foundation for a friendship which lasted as long as the senator lived.

Dr. White began to lecture privately upon dental subjects in 1839, and continued these until the formation of the Philadelphia College of Dental Surgery, in 1852.

He was active in the formation of the Pennsylvania Association of Dental Surgeons, which held its first meeting in Peale's Museum in 1845; that society celebrated its fiftieth anniversary a few weeks ago at the Continental Hotel, erected upon that spot.

Dr. White was for ten years editor of the *Dental News Letter* and for six years editor of the *Dental Cosmos.*

He was a vigorous writer, expressing his opinions, apparently, without much anxiety as to results. The time required plain speaking, and Dr. White was not the man to measure words or modify sentences when he thought it necessary to be heard.

His practice for a considerable period in Philadelphia was very extensive, his clientèle covering the best families in that city. He received honorary degrees from various colleges, and was a member of most of the leading dental societies of the world.

The founder of the present house of S. S. White Dental Manufacturing Company studied under him, as did also Dr. Thomas W. Evans, of Paris. It is said that Napoleon III. urged Dr. White to join with Dr. Evans in forming in Paris a National Dental School. This offer Dr. White declined, as it would involve a large sacrifice of practice at home.

Those who were familiar with the subject of this sketch at the best periods of his career will remember him for his mental and physical vigor. His strong animal life seemed to fit him for an unlimited strain, marvellous to those who witnessed it. It seemed as though nothing could exhaust his vitality.

As a teacher he was vigorous and thorough, as this was understood at that early period in dental teaching. While there was a certain degree of hauteur in his manner he was generally popular with his students, as they recognized in him a reserve power always appreciated by the developing mind.

His work in paving the way for a higher professional life should be better appreciated to-day than when he was active on the stage.

The jealousies and frictions of that period are dead, and we can with truth assert that hard as his blows were, the iron will that gave them force was needed not alone in his own city, but in the profession at large. This way of dealing with things naturally caused opposition, but this is sometimes better than a dead level of weakness so often generated in a profession of fuller development. He was a true pioneer and blazed a path for others to follow. If the history of dentistry in the United States is ever written as it deserves, Dr. J. D. White will hold a prominent place in it, not so much as an original thinker, but as a powerful motive force in professional life.

The latter years of his life were spent in the quiet of the Masonic Home, Philadelphia, where he died in his eightieth year.

IN MEMORY OF PROFESSOR JAMES E. GARRETSON.

A MEETING of the former students and friends of Professor James E. Garretson was held in the office of Dr. George Shidle, in Pittsburg, Pa., on November 7, 1895, Dr. A. Reinhart presiding. Drs. W. H. Fundenberg, Geo. Shidle, and Jos. Greenawalt, Committee on Resolutions, presented the following, which was adopted:

WHEREAS, In the dispensation of a wise and overruling Providence, the subject of this tribute has passed to a higher life, full of years and honors, in the zenith of his glory, and before his intellect was dimmed, or his body bowed with age.

Few men, if any, in the profession have attracted so large a share of attention, or maintained for so long a period such a degree of success.

He was indeed one of those remarkable men who stand prominently in the history of our profession as unequalled in his power of diagnosis and skill as an operator.

He possessed a wonderful faculty of communicating knowledge to his pupils, of making the most complicated subject so plain and interesting that it was rare indeed when one failed to comprehend.

To the poor and the friendless, the sick and the suffering, from the beginning to the end of his long career, he was found continually ministering.

In many respects his life had been an ideal one, a life which made the best of all that was granted it, and through it we can trace the hand of a higher one.

Sorrow so profound and general as that occasioned by the death of one so exceptionally endowed with the rarest qualities of mind, heart, and person would seem to call for general expression from those who enjoyed his friendship and benefited by his experience and writings; therefore be it

Resolved, That we are grateful for the privilege we enjoyed for many years in his wise and gracious leadership, and that we recall with admiration the enthusiasm, the courage, patience, and clear comprehension with which he guided us.

Resolved, That we will cherish his memory and endeavor to perpetuate the noble character.

Resolved, That a copy of this tribute be properly engrossed and sent to the family of the deceased.

Resolved, That a copy be sent to the dental journals for publication.

ELISHA G. TUCKER, M.D.

Resolved, That the American Academy of Dental Science deeply regrets the loss by death of Elisha G. Tucker, M.D., an honorary member and one of its original founders.

That in a professional life, begun with the soundest known foundation, and carried through more than half a century with intelligent consistency, he has left a record of perseverance in principle worthy of remembrance.

That we shall greatly miss his venerable and genial companionship, and we would express our sympathetic condolence for the family of our departed member.

JACOB L. WILLIAMS,
FREDERICK N. SEABURY,
A. F. PRESTON,
Committee.

Current News.

ODONTOGRAPHIC SOCIETY OF CHICAGO.

THE annual election of officers of the Odontographic Society of Chicago, held December 9, 1895, resulted as follows: President, Dr. C. E. Meerhoff; Vice-President, Dr. E. R. Carpenter; Secretary, Dr. H. H. Wilson; Treasurer, Dr. Edmund Noyes.

Board of Directors.—Dr. R. B. Fuller, Dr. C. E. Bentley, Dr. J. G. Reid.

Board of Censors.—Dr. A. B. Allen, Dr. H. A. Drake, Dr. G. W. Schwartz.

H. H. WILSON,
Secretary.

TOPICS FOR DISCUSSION BY STATE AND LOCAL ORGANIZATIONS.

1. Should not the appointment of Dental Examining Boards be under the control of the State dental societies?

2. Should not the granting of certificates of qualification by examining boards to non-graduates be generally abolished?

3. To what extent is the washing of amalgam masses an important feature in the production of a gold filling?

4. What results are to be expected in replantation or transplantation as a means of treatment of chronic phagedenic pericementitis?

5. The committee earnestly recommend that the report of the Committee on Dental Nomenclature of the American Dental Association be fully studied and discussed.

LOUIS JACK,
J. N. CROUSE,
EDWARD C. KIRK,
Committee on State and Local Organization.

THE

International Dental Journal.

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Original Communications.[1]

PLANTATION OF TEETH.[2]

BY LOUIS JACK, D.D.S., PHILADELPHIA.

The planting of teeth is divisible into three classes: *Transplantation*, where teeth removed from one subject are with proper precautions placed in an alveolus of another immediately after the extraction of a diseased or fractured tooth. *Replantation*, where any given tooth of a person for various reasons may have been removed, and after certain manipulation of the tooth and treatment of the socket is replaced. *Implantation*, where an artificial alveolus is made by trephining the process at a vacant place, in which opening a suitable natural tooth is introduced.

Transplantation has been credited to Dr. John Hunter, but undoubtedly had been done before him. Directly after his demonstration of the feasibility of the procedure the operation was frequently performed in England, France, and to some extent in this country. The required conditions at that time were that the tooth to be transplanted should in size and form be as near as attainable the same as the one to be substituted, and necessitated one person, for a consideration, to yield the organ for the benefit of another.

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the Academy of Stomatology, December 17, 1895.

The removal of the tooth and the substitution were made immediately, it being considered essential that the operation be done under conditions favoring direct union.

This operation soon fell into disuse for reasons which are now clear. Dangerous inflammation frequently occurred by the transmission of disease from one subject to another, and more frequently, probably by introduction of pathogenic germs, serious disorders, sometimes followed by death, ensued.

Apparently the first described attempts in this country of the transplantation of dried teeth which had been long removed appeared in a paper, by Dr. S. P. Cutter, read before the Odontological Society of New York, January 18, 1877. An abstract of cases is that two waste upper bicuspids were inserted side by side. After six months, on account of pain in the maxilla, the second bicuspid was removed, requiring considerable force to displace it. The first was permitted to remain.

CASE II.—A first bicuspid was removed; the roots broke off, were then drilled out, and the septum of bone between them drilled away. An old tooth was fixed in the socket which after ten months was firm.

Here, in passing, occurs not only the earliest attempt to use dried teeth, but also, by drilling the socket to change the form, the first suggestion of implantation appears.[1]

It should be noted here that John Hunter stated that many dentists prefer dead teeth, and, further, that he had seen dead teeth become perfectly firm after insertion, and do service for many years.

Replantation is not traceable to any authority for its beginning. It probably had its rise in the natural tendency to replace teeth dislocated by accident or removed by mistake. Our literature shows that for this purpose it was generally successful without the care which would now be exercised to insure a safe result. Within recent periods it has been performed as a means of effecting the cure of chronic alveolar abscess and other disorders of the root. The results have generally been reported as curative. This practice has been confined to the more careful and judicious practitioners, which is borne out by an examination of the literature of replantation.

Successful treatment in this manner and for this latter purpose became coincident with the scientific practice of aseptic surgery. Without careful consideration of the application of the principles

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[1] For the report and discussion, see Dental Cosmos, vol. xix., p. 258 *et seq.*

governing asepsis, replantation in disordered condition of the teeth and peridental membrane would be as liable to failure and as dangerous as transplantation in the previous century.

The *rationale* of the treatment here would appear to be, if we exclude the influence of shortening the root and occluding the root-canal, that the traumatism induces for a time an acute or subacute condition for the previous chronic one.

The relation of failures in replantation and transplantation previous to 1885 should be ignored. A tooth extracted and handled necessarily becomes an infected thing, and without disinfection its presence in the tissues of the alveolus involves a continuous struggle between the vital forces of the part and the development of bacteria. But through all these influences occasionally replanted and transplanted teeth remained for many years. I knew of a case of a man who had an inflamed lateral incisor removed. The pulp had been devitalized. Deploring the loss, he replaced it on retiring for the night. On arising it had escaped. Not to be outdone, he tore from his handkerchief a narrow part of the selvedge, and with this tied the tooth to one of the adjacent ones. It remained for fourteen years.

Implantation was undoubtedly originated by Dr. Younger, whose claim has not been publicly disputed. The date of his first operation was June 15, 1885. The general procedures of this operation as practised by him are so familiar that it is needless here to repeat them.

The result of the fixation of an implanted tooth when it has been properly adjusted and held in position has become indisputable. The evidence presented by men of reliability and sincerity of purpose has too much accumulated to fail to be convincing as to the feasibility of implantation.

There are certain requirements already established which govern success. The artificial opening must have the depth to give correct occlusion, and be but little larger than the root of the tooth to be inserted. The opening in the gum should be smaller than the cross section area at the cervix of the tooth. The mouth should be disinfected. The operator's hands and all instruments must be put in an aseptic condition. The tooth should be rendered impersonal and aseptic by being heated in a disinfectant fluid. The tooth should not have shreds of peridental membrane upon it, but should not be scraped clean of the adherent portion of the membrane. During intervals of the operation the socket should be filled with a tent of the antiseptic fluid in use. When the tooth is inserted it is better that some

force be employed to push it into place. It should then be securely fixed in position by some means which will give immobility.

With the exception of the formation of the opening in the gum and the trephining of the process, implantation has no essential differentiation from the requirements governing transplantation and replantation.

With this outline I will proceed to describe the methods I have pursued in the cases under my care.

The most important qualification connected with these operations is the means to secure thoroughness of asepsis. The usual reliance has been upon bichloride of mercury. I have avoided its use on account of its irritating influence and its depression of the vital force of the tissues, and have relied upon the aqueous solution of hydronaphtol and the aqueous solution of acetanilide.

The former is soluble in the proportions of 1 to 300. The latter is freely soluble in the ratio of 1 to 200. To effect the solution of hydronaphtol it is first dissolved in alcohol, when it becomes entirely miscible in water. In these proportions neither is irritating to the tissues, and when heated, thoroughly effect the disinfection of the tooth, the hands, and instruments. The importance of heating disinfectant solutions to increase their power has been well established. (For example, with bichloride of mercury 1 to 20,000 of urine at 104° F. prevents fermentation. Anthrax spores lose their infecting power in weak solutions of the ordinary antiseptics at 170° F.). In each case I place the tooth in either of the above disinfectant solutions and raise the temperature to the boiling-point. The instruments likewise are heated in the same manner. These and the tooth are kept in the fluid in the intervals which occur during the surgical procedures.

Generally I have subjected the selected tooth to this process for a short time after opening the pulp-chamber to disinfect the root-canals.

The importance of securing immobility of the planted tooth cannot be overestimated, since the structural changes which produce the union of the tooth cannot be expected without a state of rest. It must be as essential here as in the case of fractures, since the process of ankylosis must be analogous to the process of the union of bones. Therefore, I emphasize the necessity for absolute fixation. I take an impression in plaster, and upon the cast make a study of the case. The tooth is fitted in the plaster to correct relations with adjoining and the occluding teeth. It is then secured in place, when a metal cast is taken, and upon this is fitted

a gold splint of whatever form and with whatever attachments may give stability. This is secured by clasps or by wire ligatures to the other teeth at the cervix. Additional security and cleanliness is effected by setting it in place with phosphate of zinc.

For the front teeth, which are the most difficult to fix, in some cases I open into the pulp-chamber on the lingual surface and insert a wire parallel with this face. The splint is formed to pass between the pin and the tooth. This, if the splint is secured to the adjacent teeth, establishes the fixation in each direction.

These mechanical preparations may appear to some to be unnecessarily tedious. I have to state upon this point that in a question where success depends upon careful observances that these precautions are essential. To protect the surface of the root from injury during these procedures it is covered with a strip of mucilage paper wrapped upon it, or a layer of floss silk. To prevent drying out, the cast is covered with damp paper or kept in a box among damp paper. The final operation upon the mouth is simple, and is speedily done. It is, as above stated, preceded by every aseptic precaution.

In respect of replantation and transplantation, I invariably have broken up the remains in the alveolus of the peridental membrane. My impressions have been that this places these cases in the same relations which occur in implantation. The grounds for this procedure are that the experience of those who have replanted and transplanted teeth were of very frequent failure by early resorption, while the implantations when carefully performed have given favorable results.

I have *implanted* four cases; of these, three became fixed with apparent calcific support.

No. 1. Left upper central, male; operation April 20, 1889. In a few months it became firm and remained so for six years and five months, when it suddenly became loose and fell away. At the time of the operation the patient was in good health, but for a year or more before the resorption he had failed in vigor.

No. 2. Right upper lateral, male; operation January 12, 1895. The tooth became attached quickly, and is now resonant.

No. 3. Right upper central, same patient as No. 2.; operation same date. On account of the occlusion of the lower tooth upon the tongue of the splint, secure attachment failed. It was removed December 7, 1895, when another tooth was inserted. It is notable that the alveolus had contracted as the root became diminished by resorption, and required deepening and enlargement to receive the

new tooth. The location of these teeth had been edentulous for thirty years.

No. 4. Right upper first bicuspid, male; operation April 23, 1895. Progressed favorably; splint removed in four months. Tooth now very resonant.

My transplantations have been five.

No. 1. Left upper lateral, female; operation October 22, 1892. Tooth dead; deep pocket on palatal aspect; fistula on gum and labial aspect; apex of root much denuded of membrane and quite loose. Deepened the alveolus and firmly splinted the case; splint removed in five months; calcification was not established until four months afterwards. The tooth remains perfectly firm, and is very resonant.

No. 2. Right lower lateral; operation October 10, 1894. Profound pyorrhœa, with much resorption of margins of alveolus; patient not of good health; tooth became fastened by connective tissue, but it failed to become firm and was removed in six months. Here I was unable to attach a splint, and relied upon wire ligatures, which were not sufficient to prevent motion.

No. 3. Left upper lateral, male; operation January 12, 1895. The root here was deeply split, the parts much separated, thus enlarging the alveolus. The gum quickly embraced the root. In a few weeks the tooth became firm; it is now very resonant. Here the face became swollen, with perceptible heat, which quickly responded to treatment.

No. 4. Left upper cuspid, female; operation March 12, 1895. Here the tooth had been nearly disconnected by pericementitis; excessive flow of pus; outer plate of alveolus very much destroyed. The alveolus was fully sprayed with the solution of acetanilide; a tent also of lint saturated with an alcoholic solution of the same was applied for a few minutes. The next day swelling of the tissue about the tooth occurred. The face over the canine fossa was suffused and swollen; refrigerated face and sprayed gum with acetanilide one-half per cent. In two days these appearances subsided; no trace of pus could be elicited by pressure over the tooth. November 9, after eight months, the tooth being resonant, the splint was removed. This case is remarkable from the extent of resorption of the alveolus, and from the free suppuration consequent upon the depth of the pockets.

No. 5. Right upper second bicuspid, male. The tooth very loose from pericementitis; process much resorbed, but no discharge of pus at the time; tooth removed November 2, 1894; operation twenty

days later. The fixation by splint was not secure from disturbance by the occlusion of the lower tooth. There is now no indication of calcification.

Of replantations I have had three cases.

No. 1. Right upper first bicuspid, female; operation November 3, 1894. Displacement outward by pericementitis, with resorption of outer wall of alveolus. Reformed the socket to secure alignment. In three hours replaced the tooth. Removed splint in six months. The tooth is now firm and very resonant.

No. 2. Right upper lateral, female; operation January 19, 1895. Tooth disturbed outward and posteriorly, distorting the lip, caused by pericementitis. Deepened the alveolus and reformed it to secure alignment. Management same as in previous case. The gum became slightly inflamed, which passed away in six days. The splint was removed at end of June. Tooth firm and resonant.

No. 3. Right upper central, female; a case of pyorrhœa with enlargement of the alveolus; operation March 23, 1885. Here, because the remaining adjacent teeth were not firm, a state of immobility could not be secured. The ultimate attachment is doubtful.

The apparent promising results in teeth affected by the consequences of pericementitis is an important conclusion to be drawn from several of the above cases.

I have alluded to the means taken to keep the root clean and protect the surface from injury. If a protected root apparently free of portions of the peridental membrane be immersed in warm water or a disinfecting solution the surface slightly swells, becomes velvety to the touch, and is viscid. It is a rational conclusion that the plasma effused into the space surrounding the planted tooth must necessarily come into more intimate connection with the tooth in this condition than would be the case if the root were polished. Moreover, a tooth in the condition stated when removed during the operation for adjustment exhibits a considerable degree of resistance to displacement, which I have attributed largely to this condition.

Since the appearance of Dr. Oscar Amoedo's paper upon "Implantation of Decalcified Teeth," read before the International Medical Congress in 1894 (see *Dental Cosmos*, vol. xxxvi., p. 680), I have in each case partially decalcified the cementum, being careful not to carry the process so far as Dr. Amoedo recommended. The partial decalcification cleanses the surface, removes any slight traces of calculus and softens somewhat the surface, and is in line with the hypothetic reasons given above for the retention of

the viscid coating of the pericementum. The decalcification is not done until after the previously described mechanical procedures, and only shortly before the insertion of the tooth and immediately after the final disinfection.

The question pertinently arises whether the remains of the cementum covering the root, along with the morphological change induced by the decalcification of the surface of the cementum, may not act as a matrix to assist the organization of the plastic elements effused. While it is not in agreement with histology that dead animal substance can become revivified, it is not an irrational hypothesis to account for organization of plasma taking place under the influence of the morphological arrangement of tissue which afterwards may become resorbed. In these cases, too, the teeth assume a freshness of color scarcely distinguishable from living teeth and much different from the tint they have after their disinfection and complete preparation. This phenomenon, which cannot be vital in its nature, indicates that the influence of the fluids of the part has a marked corrective effect upon the shade of the tooth.

The condition of the surrounding tissues after these operations presents a surprisingly small degree of disturbance. When inflammation appears it does not run high, is little disposed to become diffused, and quickly yields to mild refrigeration. The general view is that the absence of any inflammatory symptoms is salutary. This may arise from the dread involved in the word, based as it probably is on the disturbing effects of that condition common to the period previous to knowledge of the methods to secure asepsis. But when reparative action is desired a certain and limited degree of excitement of the neighboring tissues is necessary to induce the supply of the plastic element required, and to set in motion the cell-development which conducts the reparative effort which closes the breach of continuity. This would appear to coincide with what takes place in simple fractures, as, when the neighboring tissues are somewhat lacerated by the separation and displacement of the fractured ends of the bone, the amount of callus is more abundant than in pipe-stem fractures, when in some instances the bones fail to be sufficiently surrounded at the seat of the fracture, and are feebly supported during the completion of calcification. May not the same principle obtain here? If the effusion of plastic matter is slight, and confined to the space between the root and the wall of the alveolus, it is reasonable to infer that the calcific connection will be comparatively thin, whereas, if the inflammatory process were deeper and more acute than is here usual, the plastic matter

would fill the contiguous alveolar spaces to greater depth, and therefore we should expect a larger zone of calcific deposit about the root.

It should be held in view in this connection that the cancellated portion of the alveolar process contains an extremely small amount of osseous tissue. In view of this fact it is important to the secure fixation of planted teeth, and of the permanence of their attachment, that the area of calcification should be extended beyond close proximity to the root of the planted tooth. Close observation, in connection with control of the secondary disturbances instead of alleviation of the inflammatory condition, is needed to establish this conclusion. If such a conclusion be reached it would appear correct to induce a greater disturbance of the tissues than is ordinarily produced by the operation.

We have in this connection the supporting fact that osteitis of the alveolar process not attended by formation of pus is followed by calcification of the cancellated portion, and that the ossification is persistent.

In my cases, where the inflammatory indications have been most apparent and longest continued the attachment has been earlier established and the ultimate resonance more marked than when no signs of secondary disturbance have been noticed.

The character of the union and the histological process by which this is brought about is the most important scientific consideration which is presented in connection with the plantation of teeth. Is it an encystment where the root is only tolerated until some local disturbance or constitutional depression occurs to bring about a retrograde process to expel the intruded tooth? or is it ankylosis where the osseous reproduction fuses the tooth to the neighboring lattice-like formation surrounding it?

The observations bearing upon these questions have not been conclusive. They have been made upon displaced teeth which have either failed to become united to their surroundings, from either local or other causes, or they have been upon teeth which, after calcification had been secured, have undergone resorption, and therefore have not told the character of the connection. We lack the observation of such teeth at their best results to determine the process of the repair of the breach between the root and the environment.

As all healing of wounds is by one method, that of organization, it is only necessary to bring to bear the observed facts which have been determined by the insertion in the tissues of pieces of dried

lung, of sponge or of pith. There quickly appears congestion about the irritant, then exudation of fluid and solid elements; the former penetrates the pores quickly, the latter slowly. Next follows the development and proliferation of connective-tissue cells and the formation of granulated tissue with development of blood-vessels.

The connective-tissue cells undergo differentiation in accordance with the tissue which is to be formed or reproduced in reparation, and are variously named as fibroblasts, osteoblasts, odontoblasts, etc.

In the process of reparation under consideration another phase of it enters into view. When dried pieces of lung-tissue are inserted for experimental observation, as previously alluded to, the leucocytes during the process of organization remove all traces of these; but if the irritant is of such a nature as to be intractable to these, another element appears,—the giant cell, the function of which is eliminatory.

If the leucocytes have the ability to remove the viscid film of the peridonteum and to take up the small amount of exposed decalcified tissue, there would appear no difficulty in the organization of the osteoblasts and the embracement of the root by their prolongations. If, on the other hand, the remains of these structures will not be accepted by the former cells, the giant cells will remove them. When this action has taken place after plantation of teeth the process does not stop here, but the cementum is attacked. The views of Amoedo and others are that this is the necessary action, and that after a time this ceases and calcifications take place in the bays so produced, and thus by the subsidence of resorption and the deposit of a layer similar to cementum the tooth becomes fixed.

This to me is a problematical result, since in each such case I have observed that the surface of the root had been placed in a more irrritating condition by the acute margins and sharp speculation, so that reparation would appear questionable. I have therefore aimed to render the tooth as slightly irritating as possible, by careful preparation, by partial decalcification, by the use of mild and stimulating aseptics combined with the most absolute rest, and the continuance of this state until resonance appears.

It is unfortunate that in too many instances planted teeth, which have become fixed and useful organs, have after several years, from causes not entirely clear, yielded to resorption and have become useless. The termination of these cases seems to come on with suddenness and without warning of the resorptive process. The cause of this result we have to look for in a depressed trophic state of the environment, in which condition it is not unreasonable to

expect tissue of repair to be the first to yield. In any defective condition of the nutrition of a part this result is in consonance with well-fixed principles.

We have also to consider that the alveolar process is a provisional structure, and that its tendency is, on the occurrence of irritation or of impaired nutrition or by static conditions, to yield to resorption. The fact that it is provisional would impress upon it the tendency to this structural change.

Notwithstanding the prognosis of planted teeth is at present precarious, the promise of useful operations is so large when selection is made of subjects in sound health and without cachectic taints that where plantation is required for the good of the patient, it should be performed. The probabilities are that greater experience will lead to improved methods and more certain results.

IS URIC ACID AN IMPORTANT FACTOR IN DENTAL DISEASE?[1]

BY DR. GEORGE D. B. DARBY, PHILADELPHIA.

Mr. President and Members of the New York Odontological Society,—The title of my paper this evening is, "Is Uric Acid an Important Factor in Dental Disease?" The lithæmic or uric acid diathesis has engaged the attention of medical and dental scientists to a considerable extent during the past decade, and the physiological and pathological conditions which have been attributed to the presence of uric acid in the blood are almost legion. It is safe to assume that errors in diagnosis would reduce somewhat the number of diseases which the more zealous adherents of the theory ascribe to the retention of uric acid in the system. On the other hand, it is not unreasonable to suppose that a poison which is capable of producing such pathological conditions in one tissue or organ may not find its limitations until many organs and tissues have felt the effect of its baneful influence.

The presence of uric acid in the blood is not a new discovery, nor is it in small quantities attended with serious consequences.

Dr. Alexander Haig, of London, who has written quite extensively upon uric acid as a factor in the causation of disease, and who

[1] Read before the New York Odontological Society, November 19, 1895.

attributes many, if not all, of the diseases that the human body is heir to, to be due to uric acid directly or indirectly, says, in regard to his own case, "Having been all my life a sufferer from migraine, it was in the autumn of 1882 that, in despair of obtaining any complete relief from drugs, and not without some fear that I was really suffering from organic disease, I gave up all butcher meat and replaced it with milk and fish. A change was at once apparent, my headaches diminished both in frequency and severity, and from an average of one in a week they fell steadily, as the diet was persevered in, down to one in a month, one in three, six, or twelve months, and eventually eighteen months elapsed without an attack of notable severity. Having arrived, then, at the conclusion that leaving off butcher's meat had practically relieved me of headache, I began to ask why this was so, and at first I was inclined to attribute it to the formation of some poison, possibly of the nature of a ptomaine, in the intestines during the digestion of the butcher's meat. But a further study of the clinical history of migraine brought out such a strong relationship to gout that I began to suspect that uric acid might be the poison of which I was in search, and I therefore proceeded to estimate the excretion of uric acid and urea. At first I estimated only the excretion of twenty-four hours, and as many of my headaches lasted only a portion of a day, I got indefinite or contradictory results; but when I separated the urine excreted during the headache from that both before and after it, a definite and distinct relation between the headache and the excretion of uric acid at once became apparent,—a relation which I have since found in myself and others in very numerous instances, quite sufficient to remove the result out of the chapter of accidental coincidences. But once having noticed the relation of this headache to the excretion of uric acid, I soon noticed that each of its concomitant symptoms bore exactly the same relation to uric acid, that when the pulse was slow and of high tension there was always a greater excretion of uric acid than when it presented the opposite character, and the same with the mental depression and scanty urine. After this a little further experimentation brought out the fact that the excretion of uric acid was completely within my control, and that I could alter it from day to day or hour to hour in either direction at pleasure.

"I soon found out that in altering the uric acid I could alter the symptoms related to it; that when I produced an increased excretion with alkali, I produced the headache, mental depression, slow pulse, and scanty urine, and that when I stopped the plus excretion

with an acid I removed all the symptoms; so that not only had I acquired the power to produce or remove the headache, but I had also the power to relax or contract the arterioles and capillaries to affect the tension of the pulse, the rate of the heart's action, and thus to influence the circulation in the brain, skin, kidneys, and probably the whole body. I also noticed that in curing a headache by giving an acid to diminish the excretion of uric acid, I always produced a certain amount of pricking and shooting pains in my joints, and it naturally occurred to me that the uric acid was held back in these joints and produced the pains. The uric acid that failed to appear in the urine must have gone somewhere. What more natural than to suppose that it had been retained in the joints, and that the pricking pains were the evidence of its presence?" Dr. Haig has found, after numerous experiments covering eight years, that a man of, say one hundred and fifty pounds, living upon a general diet, with meats, will form or introduce into his system some 18.1 grains of uric acid per day; but he will only excrete a part of this,—say 17.8 to 17.9 grains,—retaining in his system the remaining fractions of a grain, which, in a few years, will amount to many grains. He says, "I consider, therefore, that a man who eats what is called ordinary diet with butcher's meat twice a day, and does not take a great deal of exercise at the same time (for exercise keeps down the acidity and increases the excretion of uric acid), will, by the time he is thirty-five or forty, and certainly by the time he is fifty, have accumulated three hundred to four hundred grains of uric acid in his tissues, and possibly much more; and about this time, owing to the large amount of uric acid in his body, he will probably be subject to attacks of some form of gout or chronic rheumatism." It would seem as though this were particularly applicable to the troubles in the mouth with which we, as dentists, have to deal. For it is at or about this time of life that we find the first symptoms of pyorrhœa alveolaris and erosion appearing in the mouths of our patients, rarely before the thirtieth year. A number of cases that I have under my personal care are in the mouths of patients who have pronounced and well-defined gouty troubles, and others who, while they have no gout as yet, come of gouty ancestors, and who themselves are great meat-eaters and take little or no exercise. These facts would seem to bear out the assumption by Dr. Haig and others that a diet composed largely of nitrogenous foods was most favorable to the formation and retention of uric acid. Dr. Haig found, "with regard to the relation of uric acid to urea in excretion,—namely, 1 to 33 or 1 to 35,—other investigators

—Messrs. Yvon and Burlioz—found, as the result of one series of experiments, the relation of 1 to 30 and another 1 to 40; while Lecanu found much the same relation that I have,—viz., 1 to 33." Continuing, he says, "I have adopted the theory of Sir A. Harrod, that the final stage in the formation of uric acid is the formation of urate of ammonium in the kidney. According to this theory a large part of the urate so formed passes at once down the ureter and is excreted; but a small residue lingers in the kidney or the blood circulating in it, and is eventually carried over by the renal vein into the general circulation; when there it is, according to the same authority, attracted differently by different organs, and tends to be rendered less soluble, and so to be held back and accumulated in certain organs, as the liver, spleen, and certain fibrous tissues, especially those of joints, probably because these tissues are less alkaline than the rest of the tissues and fluids of the body."

Here, again, it would seem as though the teeth, covered, as they are, by a fibrous tissue and bathed almost constantly by an acid saliva, were fit subjects for the deposit of uric acid salts. Dr. Haig then says, "In the colder months of the year acidity on any given diet tends to be high (probably because there is little loss of acids in perspiration through the skin), and the balance of uric acid secretion tends to the side of retention or accumulation in the body; conversely, on the same diet, acidity rules low in the warmer months (owing to loss of acid in perspiration), and the excretion of uric acid exceeds its formation,—that is, more or less of the accumulations of the winter are washed out. This fact, that the excretion of uric acid is greater in the spring and summer months, has an important bearing on the seasonal variations of certain troubles that are due to uric acid. It is probable, however, that during the vigorous nutrition of adult life, up to and even past middle age, the acidity rules high, and year after year more uric acid is retained in the winter than is excreted in the summer, and the stores of urate in the body tend to increase; on the other hand, when from disease, or in the natural course of events from old age, nutrition begins to fail, acidity falls and remains low, excretion of urate remains more or less permanently above formation, as the urate accumulations of previous years are got again into solution in the blood and passed through the kidney into the urine."

To sum up, then, as to how uric acid is responsible for systemic disturbances in general, Dr. Haig says, "Uric acid acts as a factor in the causation of disease in one of two ways: first, as a direct local irritant when it is present in any tissues in considerable quan-

tity and probably still in solution; second, as a contractor of arterioles and capillaries, affecting, on the one hand, the circulation and nutrition of all the organs and tissues of the body, and on the other producing high arterial tension which directly affects the heart and vessel walls and otherwise influences the intracranial and thoracic circulations."

So, much, then, for the formation and retention of uric acid and its action upon the general system. Dr. Haig has shown pretty clearly that it does exist and in comparatively large amounts in the blood and tissues of almost every one, and that from one cause or another it is quite sure to make its presence known when it has accumulated in sufficient quantity, which, he argues, is likely to occur at or about the thirty-fifth year.

The first mention of uric acid (that I am aware of) as a possible cause of trouble in the mouth was by Dr. Reese, of Galveston, Texas, in the discussion of a paper upon "Pyorrhœa Alveolaris," by Dr. Rawls, before the Southern Dental Association, in May, 1885, in which Dr. Reese gave it as his opinion that uric acid was responsible for true pyorrhœa alveolaris, and that he had had the deposit found upon the teeth of persons suffering from this disease examined by a chemist, and that it was pronounced to be composed largely of uric acid. The next year he read a paper, entitled "Uræmia and its Effects upon the Teeth," before the Southern Dental Association, in which he says, "In 1880 the writer became convinced that uric acid in the blood and saliva was the cause of grave trouble in the mouth." Again, he says, "One peculiarity of uric acid is that, while it will produce violent inflammation and intense pain, it rarely causes suppuration, except when in contact with the fluids of the mouth, and not always under these circumstances. When the saliva does not come in contact, and where it is protected from the air, we have no suppuration on the roots of the teeth. On the other hand, we very frequently meet, instead of an absorption, a bony deposit known as exostosis. You will sometimes observe the gum and alveolus absorbed from the palatal root of the superior molars without suppuration, and the labial roots apparently healthy. Extraction, however, reveals that almost always exostosis is present, especially if the tooth has no antagonist. The observation of the writer is that, while the formation of tophus upon the roots of the teeth is the usual concomitant of uric acid troubles, it is not necessarily so. The absorption of the peridental membrane may take place without any deposit whatever. The absorption takes place before any deposit occurs, and is always in

advance of it, from a sixteenth to an eighth of an inch. I do not wish to be understood as saying that there is not a salivary calculus composed principally of phosphate of lime. You will sometimes see both this deposit and the tophus caused by uric acid on the same tooth, the phosphate being of lighter color and more porous."

It would seem, therefore, that this subject of uric acid as a cause of dental disease was thought of as long ago as 1880, and was made the subject of a paper in 1886, or nearly ten years ago. How much nearer the truth are we now than then? Pyorrhœa alveolaris and erosion have been made the subject of many papers and treatises during that time, being accounted for in many and various ways, but to my mind Professor C. N. Peirce has, in his paper on the "Etiology of Pyorrhœa Alveolaris," come nearer to solving the problem than any who have preceded him. He says, "In the first place I believe that, while pericementitis is associated with calcic deposit, the origin of the calcic salt and the antecedent condition which determines the locality and character of the deposit as well as the train of totally distinct symptoms which follow lead inevitably to the conclusion that two different diseases have thus far been confounded. In one form of pericementitis the origin of the calcic salt is the saliva, and in the other form, the blood. The former I shall designate as ptyalogenic calcic pericementitis, expressive of the idea that in its origin it is local, peripheral, and salivary. The latter I shall designate as hæmatogenic calcic pericementitis, expressive of the idea that in its origin it is constitutional, central, and associated with some modification of the normal composite of the blood plasma. That hæmatogenic calcic pericementitis is an altogether distinct affection from the preceding, and dependent for its cause upon some morbid material derived from the blood, will, I think, become apparent from the facts which I hope to adduce. Let it be understood that by this term reference is made to the disease with which we are all familiar as pyorrhœa alveolaris. The symptoms of this affection are too familiar to us all to detain us but a very few moments. Let it be recalled that in this form of the disease the morbid process begins on the root, and very frequently, if not usually, in the vicinity of the apical extremity, this being in marked contrast to the ptyalogenic form, which always has its origin at the gingival borders; that the inflammatory process is attended with pain, swelling, tissue disintegration, and the formation of pus; that there is a deposition of some insoluble salt upon the cementum, which, as it accumulates, eventually detaches the cemental membrane; that the alveolar

process becomes absorbed; that the root of the tooth becomes horny in appearance, etc. These symptoms, taken in connection with the fact that thus far in the curative effort the disease has successfully resisted all forms of local treatment, whether manipulative or therapeutic, it seems, would lead us inevitably to the conclusion that we have here a distinct disease of constitutional origin. In ptyalogenic pericementitis it has long been recognized that the exciting cause is a deposition of calcic phosphate and carbonate around the gingival borders, which deposition infiltrating itself into the alveo-cemental membrane is the immediate cause of the subsequent inflammation and its concomitants. Without any apparent reason it has always been assumed that in the hæmatogenic form the cause was also the deposition of similar calcic salts. The fact, however, that in true pyorrhœa the symptoms are so different, and that all local treatment has been practically so unavailing, has suggested the possibility that some other chemical agent derived from the blood, and the product of some morbid constitutional state, might be the exciting cause." As Dr. Reese, had done, Professor Peirce also had the deposit taken from teeth that had been lost through pyorrhœa examined chemically, and found that this deposit was a combination of calcic urate, sodic urate, with some calcic phosphate and carbonate; showing beyond question that this deposit is a precipitate from the blood, and that the subsequent irritation is of constitutional origin, and that hæmatogenic calcic pericementitis, as Professor Peirce has chosen to call the disease we commonly know as pyorrhœa alveolaris, is undoubtedly due to the uric acid in the blood. Again quoting from Dr. Peirce's paper, he says, "The salts found in the exudation of gouty subjects are usually urates of lime, soda, and to some extent the phosphate and carbonate of lime. After the fluid has been exuded from the vessels, the non-appropriated lymph is absorbed by the lymphatics, and the salts left behind are deposited in both the amorphous and crystalline forms. The presence of the salts acting as foreign bodies excite the ordinary phenomena of inflammation. Let us now apply these facts to the disease in question,—viz., pyorrhœa alveolaris. Inasmuch as all portions of the body have been shown by pathologists to be liable to uric acid deposits, it is not at all strange that the alveola-cemental membrane, composed largely of connective tissue, should also become a depot for uric acid deposits. It is more than probable that as a predisposing cause there might coexist some impairment in the nutrition of this membrane dependent upon either local mechanical force or some

obscure faulty innervation. However this may be, the mere presence of these salts leads to the conclusion that here as elsewhere they are derived from the blood by or through the medium of the lymph stream. With the absorption of the excess of lymph, the residual salts become precipitated upon the cemental surface. It is for this reason that I regard the deposition of uric acid as of blood origin, and the disease pyorrhœa alveolaris as one of the local manifestations of the constitutional state familiar to all pathologists as the uric acid or gouty diathesis."

As regards the constitutional treatment of these uric acid troubles in the mouth, I have recently talked with Dr. Peirce and Dr. E. C. Kirk, two firm believers in the efficacy of constitutional treatment, and equally firm in the belief that they cannot be cured nor even benefited permanently without such treatment; I have to report that Dr. Peirce has had and is having absolute cures from his form of treatment, which is as follows. Almost invariably patients suffering from pyorrhœa alveolaris will, upon inquiry, be found to be large feeders, and above all large meat-eaters, taking little or no exercise, frequently addicted more or less to the use of alcoholic liquors. In the first place all butcher's meat—such as beef, mutton, veal, etc.—is forbidden; in its place is substituted a diet of fish, the white meat of fowls, oysters, soft-boiled eggs, and milk; alcohol in every form is forbidden, and the patient is given the following treatment: fifteen minutes or half an hour before breakfast a glass of hot water with a five-grain tablet of tartarlithine dissolved therein, before luncheon another five-grain tablet in a glass of hot water, and after dinner the same dose is repeated, then at bedtime a glass of hot water without the tartarlithine is taken; so that the patient receives fifteen grains of tartarlithine and at least two quarts of hot water during the day. The tartarlithine dissolves the urates, and the hot water washes them out and aids their excretion in the urine. This treatment is kept up for several weeks, when the dose is gradually decreased, until but five grains of the tartarlithine are taken per day, but the hot water is kept up as before. Locally, any deposit there may be is carefully removed and the pockets treated with peroxide of hydrogen to remove any trace of pus there may be present, then washed out with a solution of hydronaphtol—one drachm to two ounces of water.

The patient is then given a prescription of hydronaphtol, ten grains; alcohol, one ounce; glycerin, one ounce, and water two ounces, and told to take a few drops and rinse the mouth several

times a day. Under this treatment Dr. Peirce has had in every case marked and rapid improvement, and in several cases absolute recovery. Dr. Kirk's treatment is very similar to the above, except that he gives larger doses of the tartarlithine, in some cases as high as forty grains being given in the twenty-four hours; he also recommends in some cases the use of salicylate of ammonia, one drachm divided into six powders, taken three times a day; also tartarlithine and cascara in combination, and reports equally gratifying results as those treated by Dr. Pierce. It must be remembered that, as this is a constitutional disease, at least I firmly believe it to be, if the patient goes back to the former mode of living, with the use of butcher's meat, alcoholic drinks, lack of exercise, etc., the blood will again become charged with an excess of uric acid, the deposit will, in all probability, be again formed upon the teeth, with the subsequent formation of pus, etc., and all the symptoms of hæmatogenic calcic pericementitis be again present.

In this connection of uric acid in relation to dental disease, I believe, and I think those who have had more experience in its study and treatment than I will bear me out in the statement, that in many cases of pyorrhœa erosion is also present, to a greater or less degree, and from the same constitutional causes. In those cases where there is extreme wasting away of tooth-structure and perhaps no symptoms of pyorrhœa present, if the general health of the patient is inquired into, and his mode of living, it will be found that the symptoms are almost identical with those resulting from pyorrhœa, and that sooner or later the individual will be found to be a sufferer from rheumatism or gout, which are closely allied in the uric acid diathesis.

DENTAL ANÆSTHESIA BY CATAPHORESIS.

BY WILLIAM H. ROLLINS, BOSTON, MASS.

Several articles have recently appeared in the dental journals on dental anæsthesia by cataphoresis. The impression which they convey is that this is a new thing. Now, on the contrary, it is at least thirty years old, for in 1859, Richardson extracted teeth under local anæsthesia produced by driving in medicines by the electric current. Even the use of cocaine, which is specially named in these articles, is old. Any one curious about this matter may turn to my

report on dentistry in the Boston *Medical and Surgical Journal* for 1889, where he will find that McGraw used cocaine to produce anæsthesia of the dentine by cataphoresis. In fact, it will be hard at this late date to suggest any new applications of electricity in dental matters, the ground having been gone over too thoroughly.

Even bleaching teeth by electricity, which a recent writer claimed as new, has been in print since 1888. See my report on Dentistry in Boston *Medical and Surgical Journal* for that year, where it is credited to Ames. The treatment of alveolar abscess by electricity is seventeen years old, yet in the latest work on electro-therapeutics, the "International System of Electro-Therapeutics," edited by Bigelow, alveolar abscess is particularly mentioned as not a suitable subject for treatment by electricity. I expect to see the treatment of Riggs's disease and erosion by electricity rediscovered soon, as these methods have had about the usual time which I find it takes new dental ideas to diffuse themselves through the air with sufficient intensity to bring about this result.

As there is no doubt that the time is arriving when dental anæsthesia by cataphoresis will be more used than it has been, I wish to make some suggestions which are the result of long use of this agent. First, I have found by actual experience that the ordinary methods of using the street current are open to serious objections. Two dangers are always present,—risk of a short circuit and risk from return current through the ground.

The ordinary method, which physicians employ in electro-therapeutics, for reducing the current is a compact resistance on one wire. Turn to any recent work in which resistances are figured, and see how near the binding posts are to each other and how easy it is to cut out the resistance entirely by an instrument falling in contact with them, thus exposing the patient or the operator or both to the full current, which, to say the least, is very unpleasant. Or suppose the resistance is on the neutral main, and as these mains look alike and have no labels on them this may happen, then if the operator touch any one of the several terminals of other circuits which are needed about the modern dental chair, or even if he touch a gas burner, he or his patient or both may get a severe shock. When I first began to use the street current with the ordinary form of resistance I had this experience. To avoid all these and other dangers I arrange my resistance in another way, and do not use a single resistance or a compact resistance which can be easily short circuited. On each main I place thirty lamps, each of eight candle-power and in series. These two resistances

are placed far apart at the top of the room where there is no possibility of a short circuit. This arrangement I call the minimum multiple resistance. On a hundred and ten volt circuit the maximum current that can pass at short circuit is four milliampères, which is the greatest current ever needed in dental electro-therapeutics. I also have a rotary resistance of a binary form, both sides being exactly alike and each side connected with one main. This further resistance, which I call the wave-maker, reduces the current to one one-hundredth of a milliampère, but by rotating it the full current which the minimum multiple resistance can transmit may be obtained gradually, or by stopping short of half a revolution any intermediate current may be obtained. With the resistance fixed in this way it is impossible for either the patient or the operator to get a current of greater strength than twice that which he is using, a circumstance of no moment. By rotating this wave-maker by means of a small electric motor I obtain the wave-current for treating the severe cramps of the muscles of the jaws which make long dental operations so painful to some patients. I do not know who first employed the wave-current in electro-therapeutics, but Kellogg has used it so long that it must be considered old. The point which I wish to make in this paper is that the periodical literature ought to be more carefully read, for as it is at present every original man, unless he is a really great man, must see his ideas buried for years (unless he patents them), and then credited to some one else. This is always a little discouraging, and deprives the profession of many useful things for a number of years.

Reports of Society Meetings.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 41.)

August 8, 1895.—Third Day.—Morning Session.

Meeting called to order by Dr. Watkins, who presided.

The minutes of the previous meeting were read and approved.

Dr. Ambler's paper, "Titles and Number of Articles which have appeared in Dental Journals during the Past Year pertaining to Operative Dentistry," was read by title only.

The president appointed on the committee as to the condition of the mouth and teeth as bearing on life insurance the following gentlemen:

Drs. Frank Abbott, C. S. Stockton, J. S. Marshall, T. W. Brophy, and S. G. Perry.

Dr. Taft.—Dr. Corydon Palmer, one of the oldest practitioners in the country, is present with us to-day, and he would be pleased to have a few minutes to speak to this Association. I move that he be allowed twenty minutes, at some proper time, to address this society on any subject he may choose.

Motion carried.

Dr. Crouse.—Dr. John Tomes died about a week ago, and I would move that we take some action on his death.

Referred to the Committee on Necrology.

Dr. Corydon Palmer.—In what I have to say, I must refer to the past briefly. I see around me the older members of the profession, and also some new ones, whom I greet. It is well known to the older members of the Association that I began early in 1839 with the first meetings that were held. We had our great leader then, and I stood by his side and helped to bring forward his fine teachings.

What I have to say and to show is something which does not need to go into discussion. I only wish to announce it, and let you say whether it is good. Of late I have divided my time most concentratedly upon one appliance. I refer to an angle appliance for the hand-piece. There are a great many of them, and I have an admiration for them all. There has been only one kind of an angle that has been entirely overlooked, and I have endeavored through manufacturers and others to have it produced, but they say it cannot be done. The one I propose is a quarter angle, and what I wish to have you understand is that there is something about a quarter angle that is strong, and it can take the place largely of the straight hand-piece for excavating. It is my first effort, and entirely my own design. No one has yet looked upon it, and I place it first before you.

(Illustrating on black-board.) It will be found to be more convenient than a straight hand-piece. I do not say it is perfect. I have not fine engine machinery to do it with, and I was obliged to do it in a different way. I have something to say in reference to burs to be used in the hand-piece; it might be said I am pleading for trade and for manufacturers, but this body understands that I have never put anything on sale. What I have had I have given freely,

and I have done it because I love my profession. This is the form I advocate; instead of making it as large in proportion to the bur, each of a different size, they should reduce this portion of the larger burs, and give us the advantage of all this part here to cut deeply into the tooth. (Illustrating.) On one-half of this card I have some burs of my own design that have never been shown, and on the other side are some of the other burs, which have been reduced to the size which I consider best. What we want is a wheel bur, the shank part of which is reduced to a small size and long enough to give us the advantage of all that the bur is worth. My burs cut with a drawing stroke; ordinarily they are not made that way.

There is a great deal being said about microbes and leucocytes. I have nothing to do with them. I have a drill here to give the final touch in the foramen of a tooth. The ones we have had are so formed that they carry before them the devitalized and putrescent matter which a root contains, and push it through the point of the root. I have endeavored in making this nerve instrument to have something which will take away with it that portion which it cuts, and not carry it before it. Here is a little thing which I want to show you, to follow that delicate portion to the end of the root. It will bring away with it, to the very last touch, all that it has cut off. I would like to have some steel for these instruments which has a tough fibre. If we could get piano wire large enough to hold, it would be a good thing.

The following is the discussion of the papers read last evening by Drs. Smith and Patterson:

Dr. Smith.—I purposely present myself this morning for the opening of this discussion that we may discuss the paper which was read fairly and from the right stand-point. It seemed to me last evening that there was a disposition to misunderstand the intent of the paper. The first gentleman spoke of the kind intentions of our heavenly Father. He said, if it was the design of Nature that the tooth later in life should present itself in such a way that the pulp should be of no value, then Nature would have made provision for taking away the pulp. The intention of the paper was that we might better understand not the destruction, but the preservation of the pulp, and to place it and the teeth, which it protects, in its right light. It was not the intention of a kind Providence that we should see men on crutches or with empty sleeves, but we do see them; and we see another thing,—that He left to the human race the solving of the problem how best this con-

dition of things may be met, just as He has left to the human race the problem of how best to meet the disabled conditions of the human teeth. It is for us to work it out. We are to do it in the right spirit. The pulp of a tooth is not a holy thing. We may operate on it if we find it necessary to do so. It is the teaching of this paper that wherever the pulp stands in the way of making the tooth useful we are to destroy it if necessary. The intent of the paper was not that there should be a wholesale destruction of pulps, but whether we are to regard it in young life or in middle life and old age as so sacred that we are not to approach its domain. The teachings of the present and the past have been without discrimination in regard to the dental pulp. There is a period of life when it is a holy thing. It is in the holy of holies, and is not to be interfered with; but later we may enter the domain of the pulp with perfect assurance, when it stands in the way of our doing the best we can for the relief of the patient, and then it is for us to destroy it.

In reply to Dr. McKellops: I estimate the matter of education among the masses of such importance that I would gladly receive from this Association any suggestions in relation to the matter. I think it is the best thing for us to do for the masses who are suffering. I would be very glad if this Association would discuss the point, and do something for the relief of the poor. The impression seemed to be given us yesterday that even the dental colleges should be suppressed, and the clinics and infirmaries suppressed rather than widened. However many there are, however great the number of students, they do not begin to touch the number of suffering people who should have relief.

My friend Dr. Truman turned the sentiments of the paper into a channel entirely foreign to the plain meaning thereof, and because he said, after having done that, "I do not believe it," he did not change the facts that are there.

I have a reply to the discussion as it was entered into by my good friend Dr. Black. I have the profoundest regard for Dr. Black. I have read his papers and watched his course, which is in the interests of the dental profession. It may be twenty years ago that I saw a little article in one of our journals by Dr. Black, and I have watched him from that time. He gave me in that little article a hint which has been of the greatest value to me. He said, "Why is it that some days your gold-foil does not work well, and on other occasions it seems to work very well, all of it being from the same book? If you look to your annealing-lamp, pos-

sibly you will find the burnt end of a match lying on the wick, and this is the whole secret, because of the phosphorus which is emitted from the end of this burning match, which interferes with the working of the gold." I do not know that I ever light my spirit lamp without thinking of Dr. Black. A man who will throw out such hints as that to the profession is a man to be respected, and whose opinions are to be regarded.

There was nothing in the whole discussion last evening, or in the preparation of the paper, that so pleased me as did the remarks of Dr. Black. Although seeming to be in entire opposition to the paper, they were in entire confirmation of it. He stated that this consolidation of the tooth which we speak of, and to which we attach so much importance, began in early life, that it continued to the period of about fifteen years, when it lessened, to a later period, when it again increased, and in middle life it almost seemed to stop. Is not that almost the same idea that I mentioned in my paper? He said there was a change, and that is what I claim. There is a change in the tooth-structure. Destroy the pulp at six or eight or ten years of age, and you have made a tooth which yields readily to decay. Keep it in good condition to middle life, and you have so changed it that it has become decay-resisting. The vital forces within the tooth have fought against the externals, which have been attacking it, and they have conquered, and built the tooth into a material which is decay-resisting.

The paper was entitled "The Office of the Dental Pulp and its Eccentricities." I intended that that should be one of the eccentricities of the pulp,—not a normal condition. The tooth which he analyzed may have been one which had really been consolidated, but I do not claim that that is the normal condition of the pulp. There are instances where the tooth actually becomes softened. Whether it is due to an increase of density in the tooth or to some other cause I care not. No man will dare to say that these teeth do not change and become soft, and fillings that have preserved cavities for years begin to drop out through softening around the cavity. I claim it is the action of the pulp that does it.

Dr. Abbott.—From the way Dr. Smith's paper read last night, and the remarks of Dr. Black following it, you would certainly judge that they were in opposition to each other. The paper stated most positively that there is a change in a tooth in old age, which apparently would indicate decalcification of the dentine. I think this is true, but I have never attributed it to the action of the pulp. I believe the pulp keeps on depositing lime salts

as long as the pulp is alive, and the tooth becomes more solid and perfect every day. Eventually, even the pulp-chamber itself becomes obliterated. I have never seen a case of softening anywhere excepting when the necks of the teeth and quite a portion of the roots had been exposed. I have always attributed this condition to the fact that there was an acid that was slowly decalcifying the tooth; that there was an action that was absolutely pathological. I may be wrong, but I am positive that the action of the pulp is going on in ordinary teeth constantly in the form of supplying lime salts.

The question of pyorrhœa came up in the paper as read last night. It was asked, "Why is it that teeth that do not decay and are the best we find in the mouth, seem to be more subject to this deposit than those which have to be cared for or are filled?" I think it is due to the fact that the persons whose teeth decay constantly have visited a conscientious dentist and had the tartar removed from them. The result has been that in one instance every particle of tartar is removed from time to time, and in the other it is not. There are people who will boast that they have never been in a dentist's chair.

In reference to the second paper read, I want to speak of the materials used for capping the pulps of teeth. I am in favor of saving them always and in every instance. I consider it a crime to destroy the pulp in a tooth. We want the material for exposed pulps that will save them and keep them comfortable for a long time. It was recommended in this paper that gold be used by placing it over the cavity and burnishing it. If any space is left between the exposed point of a pulp and the material you place over it, that space will fill with serum, notwithstanding you may use escharotics, and you cannot by any means place gold or any metal there that will not admit it somewhere.

Dr. Patterson.—I did not advocate any such practice. I was referring to deep-seated cavities, not near the pulp.

Dr. Abbott.—Then I have been mistaken. But the point is a good one nevertheless, and I want it understood. The material that is necessary for capping pulps of teeth must not expand nor contract and it must fit the opening perfectly, and these qualities must be present with every case or we will fail. Another point in the treatment of a pulp is that the pulp should never be punctured by any means or it will die. Gutta-percha was recommended for capping the pulps of teeth. This fails with me invariably, and the pulp will die, because gutta-percha expands and it presses upon

the pulp, and the slightest irritation—the weight of a hair, even—will cause the death of the pulp eventually. Usually I recommend that this be not used with any idea of success in the capping of pulps of teeth.

Dr. Shields.—From Dr. Smith's reply this morning, I took it for granted that he was under the impression that the discussion was closed. A very important point in his paper has not been reached. He said, after a pulp has been saved for a number of years, the cavity can be filled with gold, and owing to the condition of the pulp and the change in the dentine, you will find around the margin of the tooth blackness, which is nothing but defective workmanship, and the dentine has nothing in the world to do with it. The question of the compatibility and incompatibility of gold should not be entered into. If the gold is properly introduced into a cavity, you will never have a black rim around a filling.

Dr. Rhein.—The point in Dr. Smith's paper, in which he refers to the care of children's teeth, is one to which we should give our attention. If there is any body of dentists in this country, in an official capacity, which owes a duty to the public, it is this Association. That point of the paper has struck a responsive chord within me. I believe that it ought to be part of our duty to endeavor to do something in the way of improving the teeth of future generations in this country. I refer to the condition of children's teeth before they are admitted to the public schools for the daily session. If, as a national organization, we would send some communication to the various boards of school commissioners throughout this country, informing them of the value of examination of children's teeth before entering upon their studies, one of the greatest benefits for the future condition of the teeth of the people of this country would be achieved.

A great deal of stress is placed in the public schools upon the general condition of the cleanliness of the scholars when they make their daily appearance. I believe the children are not admitted to the sessions with dirty hands or faces, but are sent home to be washed. We know very well how much greater importance ought to be placed on the condition of those children's mouths.

In reference to the condition of pulps, I wish to say a word. I agree with Dr. Smith and the other gentlemen in regard to the preservation of the pulps of teeth before they have reached the age of maturity, before the tooth-structure has been properly consolidated, and I agree with the distinction the author of the paper has made, that the class of cases to which he had reference were

not normal physiological conditions, but conditions that were pathological. There is some disturbance of the nutrition, usually a lack of nutrition. Professor Black referred to this point in his discussion last night. It is nutrition either in excess through excessive irritation, or a lack of the proper protoplasmic irritation. Is it advisable to allow an adult tooth to go on with a condition of abnormality about the pulp, or is it better to remove such a pulp? The weight of all the experience which I have had on this subject has been towards the immediate removal of a pulp as soon as an abnormal condition presents itself. Many of the gentlemen to whom I have listened, and who advocate the preservation of the pulp of a tooth at all hazards, are not aware of the fact that these cases may find themselves in the offices of other men, with abscesses or other conditions due to the fact that they have endeavored to save an organ whose usefulness has departed.

I do not agree with the author in his remarks on pyorrhœa alveolaris. In his very admirable paper he does not differentiate between what forms of pyorrhœa he has reference to. There has been under observation a very limited class of pyorrhœa cases which have their origin in pulp disturbances and make themselves known around the apex of the root; but these cases are very rare, and constitute but an infinitesimal portion of the pyorrhœa cases that present themselves. I want to take issue with the statement that pyorrhœa does not present itself in youthful patients. In the paper on "Infantile Scorbutus," presented before the First District Dental Society of New York, by Dr. Kirk, and published in the *Dental Cosmos*, he distinctly calls attention to infantile pyorrhœa, and I referred to a similar case that reached my hands. The mother of the child had been formerly under the attention of Dr. McManus, of Hartford. The child was eighteen months of age at the time. I have noticed pyorrhœal cases in children of all ages after various diseases, such as typhoid fever, scarlatina, and diphtheria,—diseases which interfere with the nutrition of the body to a great extent. But it is probable that these conditions do not reach the notice of the dentist unless they are looked for. The dental organs are in a much more healthy condition at that age than we find them later in life. After the patient has recovered from such an illness, it takes but a few weeks to get back to a healthy condition. If the gentlemen will visit the wards of the hospitals where there are cases of this kind. I challenge their observation of the gums of such patients, especially in the convalescent stages of disease. I lay special stress on this point, as I did last year, because it is time

that we should distinguish what form of pyorrhœa we are discussing. With reference to the limited class of pyorrhœa which the author of that paper speaks of, I agree with him, but I wish to have that discrimination made because it refers to only a very limited number of such cases.

Dr. McManus.—I wish to say a word or two about that case, because a gentleman asked me why I neglected my patient and had to have the case go into the hands of Dr. Rhein. The patient he speaks of is the child of a patient of mine. She was my patient before she married for a number of years; she married a physician in New York, and this little child of hers needed the services of a dentist. She wrote to me asking to whom she should go; I recommended Dr. Rhein, and they have been very much pleased with Dr. Rhein's services.

Dr. Hunt (of Iowa).—I followed the reading of Dr. Smith's paper with considerable care, but I was confused in the terms that he used that were not familiar to me in the connection in which he used them. I hope before the discussion of the paper is closed he will make some explanation. In referring to the dentine and enamel, he used the terms "rebuilding" and "recalcification." He also speaks of a pulpless tooth. I think the statement is that pyorrhœa does not attack a tooth in which the pulp is destroyed. Three or four years ago, Dr. Miller, of Iowa, announced that pulpless teeth were not affected by pyorrhœa, and teeth adjoining pulpless teeth yielded to treatment rather more readily. I have given some attention to this feature of pyorrhœa, as to whether there was any difference perceptible in the condition of the tooth,—whether more amenable to treatment or not, if the pulp were devitalized. I do not as yet observe anything that would warrant me in thinking that there is. However, this difference must be demonstrated in some other way than by clinical observation. Another point in the paper which seems very strange to me is that the doctor should claim that the pulp becomes in old life an element of destruction of the teeth. The indications for this are that teeth begin to soften around fillings in a good class of teeth. I have always supposed that destruction of the teeth, or caries, as it is commonly called, must proceed from without. I supposed that this had been demonstrated quite clearly. I think the condition he mentions can fairly be accounted for upon that fact, that heretofore all of the conditions of the disintegration of the teeth have been caused from exterior conditions. We shall have to look a little further than the ordinary dental operation to find the cause.

It is very common among people past middle life to be afflicted with various diseases; hardly any one past that time of life is entirely free from some disturbance, either of the vital organs themselves or of the parts in close connection with them. My own opinion is that this condition of the softening about the margins of fillings is due to a changed condition in the mouth that presents a more favorable field for bacteria. Nearly all of the disturbances of the kidneys, liver, lungs, etc., would account for this change. In one case—that of a gentleman of fifty-five years—I found this same condition in the mouth. I was curious to know what caused it, and I removed a portion of the decay and sent it to the pathological laboratory for examination. The report was that the individual was afflicted with pulmonary phthisis. I did not expect that at all, because there were no external signs of it; but I thought there was a constitutional disturbance which caused certain secretions. We will have to change our views about what causes decay in teeth if it is demonstrated that the pulp becomes an organ of disintegration. We have an abundance of proof that this organ is constantly carrying nutritive material and consolidating the teeth.

In regard to a point in Dr. Patterson's paper, I think the statement was that non-cohesive or soft foil could not be made cohesive,—in other words, welded together,—and because of this fact, the soft gold became a better non-conductor of thermal changes. One instance came to my mind. Not very long back, Dr. Gardiner had occasion to examine a tooth filled by Dr. Allport thirty-five years before. The tooth had become so badly disintegrated that it was necessary to remove the filling, and Dr. Gardiner out of curiosity wanted to know what kind of gold was used in that cavity. Dr. Allport, who kept a register, reported that it was filled with soft foil. It was passed through a set of rolling-mills and rolled into a sheet. If there had been no welding of the sheets of the foil, that could not have been done.

Dr. Jack moved that, inasmuch as there were so many papers, the discussion be limited to five minutes for each speaker. Carried.

Dr. Stainton moved that the gentlemen who read the papers be given five minutes each to close the discussion. Carried.

Dr. Smith.—I had hoped that you would allow me to say just a word about this point: as to whether there was any difference between the devitalization of the pulps at different periods of life. Dr. Abbott claims there is not, but it seems to me there is. Pulp-capping has been alluded to, and the question asked at what period shall we do our pulp-capping. The point of the paper is this: that

if a tooth has resolved itself into a pathological condition of the exposure of the pulp, or any other reason, the pulp can be destroyed, and it is better to do it than to cap the pulp. It seems to be implied that it is just as easy to attempt the capping of a wisdom-tooth on its distal face, or the distal face of an upper or lower molar decayed way down to the root, as to cap any other tooth. Notwithstanding, all these distinctions should be carefully made. Who dare attempt to destroy the pulp of a lower wisdom-tooth exposed from the distal face? It is a risk in regard to the life of a patient. Who dare attempt the capping of a pulp in a lateral incisor where your room is limited? In a lower molar tooth, where the conditions are favorable, we can discuss the question of capping the pulp. It never entered my mind to cap the pulp of a bicuspid or lateral after the pulp has become consolidated, because of the almost certainty of the unfavorable results which would follow.

Dr. Patterson.—In regard to the non-cohesive gold, I want to say that it is not amenable to any welding process. The soft foil that Dr. Hunt referred to is soft cohesive foil, which is entirely different. The distinction is not very clear as to what dead, soft, non-cohesive gold is. There can be no welding between one sheet and the other, and there never is.

Dr. Rhein.—Before we leave the subject I would like to offer to the Association the following resolutions embracing the point of children's teeth, mentioned in Dr. Smith's paper:

Resolved, That a committee of three be appointed whose duty it shall be to draw up a suitable circular letter embracing the recommendation in Dr. Smith's paper concerning the cleanliness of teeth of school children. They shall cause that to be sent to the various boards of education throughout the United States, and to be sent to the dental journals and press generally.

Resolved, That such committee be reimbursed from the treasury of the Association for any expense they may incur.

Motion made to lay the resolutions on the table.

Dr. Bryan (of Switzerland).—I have been informed that you have done me the high honor of making me an honorary member of this society. I want to thank you, and to say that if I am not now worthy, my future efforts in dental life shall be to earn and deserve that honor.

Dr. Bryan also read a short paper on "The New Mat Gold," of which an abstract follows:

The dream of the dentist since the discovery of the cohesive properties of gold-foil has been to find a cohesive gold preparation

which would be sufficiently plastic to be used as the cements and amalgams of the day are used. Within the last few years a limited circle of dentists in Switzerland have passed the word that Dr. de Trey had solved the riddle, and was in possession of the secret of preparing an ideal plastic gold. Within the last few months the gold has been placed on the market, and our Swiss friends are quite enthusiastic about it. If in time Solila gold does not satisfy our wants, and prove the ideal gold which many disinterested people of to-day think, it will certainly indicate the road to other pilgrims seeking the ideal, for it is a step in the right direction.

As so much was being said in praise of the Solila gold, I went to Dr. de Trey, despite certain personal differences, and asked him for some information about the gold, but I was unable to learn anything about the preparation of it. The doctor filled some teeth out of the mouth in a remarkably short space of time, and the manipulation was such that I had my doubts about the adaptation and general cohesion of the mass of gold condensed by hand-pressure and very slight malleting, building up a contour filling, with no undercuts or retaining points, in certainly one-quarter the time usually employed in such cases by the usual methods. I not only had the curiosity to have the filling removed and rolled out, but I wanted to see it done, and was taken into the laboratory, where the filling was rolled out into a beautiful yellow, soft ribbon of about No. 250, without a defect, as far as I could see.

Dr. Jenkins, who is now the president of the American Dental Society in Europe, reports much pleasure in its use for the short time it has been on the market, but says he prefers to finish the filling with a gold which does not require so much time to finish down, owing to its extreme hardness, even after hand-pressure condensation. This gold should not be malleted like other gold, as the first stroke condenses the point under the packer, and a second blow will cause pain and be of no advantage. Dr. Patterson reports very great facility in rapid filling, little loss of gold, and superiority to the other crystal mat golds on the market, but, like myself, can only judge of it superficially. For the last month I have used this gold exclusively, as a test of its general adaptability, and I am generally pleased with the results.

Dr. Bryan also showed several instruments which he had brought with him, including a sponge-holder with mirror, a mirror with shell-shaped rim for carrying fillings to teeth or parts of teeth that are not easily reached, a cervical clamp, and some matrices, together with a stand to hold the same.

Dr. Shields, of New York, read his paper, entitled "Scientific Filling of Difficult Roots." He said that all operative dentistry is minor surgery. All dental operations are the embodiment of mechanism of the highest order. Whenever we have to substitute any portion of our anatomy we at once undertake a most difficult task. We are fearfully and wonderfully made, and no branch of medicine so thoroughly recognizes this fact as dental surgery. The tooth becomes decayed from the inability of the dental pulp to throw out odontoblasts sufficiently fast, and it becomes exposed and dies. We are called upon to fill the tooth, and make it as perfect as it was before. Our Lord made our teeth, and poor finite man can only fill them imperfectly; but we must come as near perfection as we can. We must reach the apex of each canal, and we must not know the meaning of the word "fail." All canals can be thoroughly cleansed to their very apices, and not a particle of decomposition remain. Apply the rubber dam, and always open into a canal with a bur, because you will not block the mouth of the canal with large pieces of tooth-structure. Save all the tooth-structure possible, but do not allow tooth-structure to prevent your entrance into a canal. After opening into the canal with a bur use Donaldson's nerve-canal cleaners, Nos. 4 and 5. With a small cleanser and a little perseverance, I can readily reach the apex of a difficult canal. I puncture the small piece of rubber dam with the cleanser, and can reach the apex, and indicate with the dam the exact length of the root from apex to grinding or cutting surface. I clean the canal, and treat it with non-coagulating disinfectants. Then I introduce a larger cleanser, and if it should block up the canal, the obstruction can easily be removed by inserting the original cleanser, and turning it around a few times between thumb and forefinger. I use soft gold-foil No. 4, and if I am filling a small canal, do not fold it at all, but cut it into strips and the strips into pieces about one-quarter the size of a pin-head. The gold displaces the air in the canal, and gold being a solid substance is readily indicated by the indicator when it reaches the apex. I know I fill the apex. In surgery we do not guess at things, but we coolly calculate them, and know that they are correct.

Dr. Freeman then read a paper entitled, "The Use of Compressed Air in Operative Dentistry," and illustrated the same with numerous instruments. An abstract of the same follows:

Every workman in the exercise of his art should be provided with proper implements. The dentist who is called upon to treat and relieve pain of such delicate and sensitive structures as the

teeth should naturally look forward to that which can assist him in the practice of his profession, and it is essential to his success that he be provided with all the necessary appliances which will aid him in his operations and mitigate the sufferings of his patients.

No procedure appears to me to be more conducive to success than the application of compressed air. Permit me to explain the methods of producing compressed air, and the manner of conducting the same to your operating-chair. It is obtained by means of a suction-pump, which soaks in the air and forces it through a pipe to a reservoir. I would not advise the use of a small hand-pump or cylinder, as you will find that both the air and the operator become quickly exhausted, but would recommend that which is known as the champion beer-pump, or the compound pump of the same manufacturer, as I find them the most satisfactory air-compressers on the market to-day.

Before placing the pump in your office ascertain how many pounds of water-pressure you have. If, as in my office, you have only twenty-five pounds, the champion pump will not furnish (contrary to the claim of the manufacturers) the same amount of air-pressure as water, as there is a loss of a few pounds. Such being the case, the compound pump is preferable, as it is frequently necessary to have the air at a pressure of forty to fifty pounds to the square inch. This pump we connected with the reservoir, which is a tank containing eighteen gallons of air, tested to one hundred and fifty pounds pressure to the square inch. From this runs a quarter-inch block-tin pipe, with branches to my laboratory and operating-room. To this I had attached a regulator and a gauge, the regulator being nothing more than a screw-valve; as you loosen the screw you close the valve, and *vice versa*. From the regulator a pipe leads to the gauge, which indicates the number of pounds pressure. To the gauge is connected a distributing-pipe, with three small cocks to attach the rubber tubes and the cut-off. The tubes should be of heavy rubber, so as to withstand a high air-pressure. The cut-offs close automatically, and you may use the somewhat antiquated expression, "Touch the button, and the air will do the rest!"

In the practice of dentistry it is absolutely necessary to have the mouth in an antiseptic condition. To produce this effect many of you use a hand-atomizer, which by the continuous pressure of the bulb causes a slight cramp in the hand. With the compressed-air apparatus, we do away with this work. You have the tube

steadied, and can thoroughly cleanse the mouth or any cavity. I derive excellent results from the following prescription:

℞ Borine, 1 part;
Pyrozone med. 3 per cent., 2 parts;
Water, 1 part.

No doubt you have frequently met cases where you would prefer to place on the rubber dam, but owing to the patient's inability to breathe through the nostrils you were compelled to send your patient away or work at a great disadvantage. The remedy is a simple one. A two-per-cent. solution of cocaine placed in an atomizer attached to your compressed-air apparatus, which is gauged at ten to fifteen pounds pressure, and the spray thrown into the nostrils, will invariably relieve that posterior nasal catarrh, or reduce the swollen tissues of the nares to such an extent that you can proceed with your work in a few minutes.

In using the spray for this purpose you have your patient sitting upright in the chair, the head inclined slightly forward. Insert the tube horizontally into the nares, and do not apply over ten to fifteen pounds of air-pressure, as otherwise you may set up an irritation of the middle ear.

In stomatitis of the various kinds the spray, employed with a high pressure produces excellent results. Before applying any medicine to the gums it is always necessary to have a dry surface, so that the medicament may be readily absorbed, and not distribute itself over the surface of the tissue. I found it somewhat difficult to obtain a dry condition of the gums in the posterior portion of the mouth before employing this apparatus. Now I find it a very simple matter. By drawing back the corners of the mouth with a napkin or piece of cottonoid, and throwing the compressed air directly to the spot, it only requires a few seconds to procure the desired condition of the mouth, and upon applying your medicines you get immediate absorption.

In the treatment of pyorrhœa alveolaris it is absolutely essential that every particle of deposit, of whatever form, shall be removed, and the *débris* thoroughly washed away, leaving no particles to be ulcerated. To do this it requires a vigorous stream of water. Dr. J. N. Farrar introduced for this purpose a set of four syringes with delicate points. I use this attached to my compressed-air apparatus, at fifty to sixty pounds pressure, which throws a stream with such force as to entirely cleanse the parts. I employ these spray tubes with my compressed-air apparatus for introducing medicine

and washing out cavities preparatory to implanting teeth, and I may be concise and say for all wounds and diseases of the oral cavity.

After considering the advantages derived from the aid of compressed air upon the soft tissues I will briefly state the results procured through the medium of these agents on the hard tissues,—the teeth.

It is not necessary for me to cite in detail the minute anatomy of the teeth, although a thorough knowledge of the structure of the dentine is requisite to fully appreciate the ideas which I wish to convey.

Drs. Harlan, Kirk, and Truman demonstrated by experiment that there is an absorption of liquids by osmotic action. Their statements have awakened the profession and provoked no little discussion, although the controversial period is usually only a passing, and never the most fruitful, period of any new truth. These gentlemen have established the fact that medicines will be absorbed through the tubuli after a certain length of time. You will remember that the glue-yielding portion of a tooth contains water to about ten per cent. of the weight of the entire tooth. Bearing this in mind, let me ask you what can we accomplish after dehydration of the tissue, leaving entirely out of consideration the capillary attraction of these infinitesimal dentinal tubes? It has been demonstrated that when water is removed from a tooth the normal function of transmitting impressions seems to be modified. We know that heat and cold will produce pain, and in the application of either we should proceed with extreme caution.

I use a hot-air syringe similar to the S. S. White No. 30, only it has twice as large a cylinder. The chamber is filled with carbon, which is one of the best materials for retaining caloric. With these syringes attached to the compressed-air apparatus, you can so regulate the flow of air that in from one to five minutes you have your tooth thoroughly dry. Then introduce your medicine, heated to about 95° F., and again applying your warm-air current, with about forty pounds pressure, you will be able to excavate your tooth without pain, nor will you have any subsequent irritation. In the bleaching of teeth, I find that by the application of hot air at a high pressure I am able to produce the required condition in one-half the usual time, as you rapidly evaporate the pyrozone twenty-five per cent. and force it into the tubuli.

For drying out root-canals use this small point on your syringe, and you can carry heated air directly into the canal, and with a

high pressure can force your antiseptic through the canaliculi and tubules, rendering the tissues thoroughly aseptic.

In setting pivot teeth, we often find it difficult to carry the cement to the upper portion of the root. In forcing it into the root-canal with a dry instrument, upon withdrawal of the latter the cement is found adherent to it, not to the walls of the root; but with a high pressure you can force it into every irregularity of the root, while at the same time the compressed air will dry all the surrounding tissue, and you avoid the necessity of wiping away the moisture excreted by the mucous glands.

Dr. Taft moved that the Committee on the National Museum consist of five members instead of three, and the motion was carried.

Adjourned.

(To be continued.)

ACADEMY OF STOMATOLOGY.

The regular meeting of the Academy was held December 17, 1895. In the absence of the President, Dr. James Truman, Vice-President, called the meeting to order.

Dr. Kirk on behalf of the Council made a report.

Dr. Younger was called upon to explain the workings of a dental society in San Francisco of which he was a member, and said, in response to the request, "The Stomatological Club was organized as a dental club for the purpose of entertaining members of the World's Fair Dental Congress. It had a membership reaching from China, the Hawaiian Islands, Chile, and Denver. We had also present several members from the East. After the Congress we were so impressed with the clinical work and the advantages that we determined then to maintain the Club, both for the social and the clinical features, which latter had become *the* feature of the Club, and for that purpose we meet every Tuesday afternoon at three o'clock. A clinician is appointed, and if he fails to do his duty he is fined ten dollars. At first, from timidity, the members preferred to pay the fine rather than perform the duties of the clinic, but they have all been so enthused with the advantages that there are in fact two or three ready all the time to take the place of any one who fails.

"It has become so well known that people come from a distance,

and we have very important consultations. We found the name Dental Club did not express its use, so we called it the Stomatological Club. We hold clinics there as long as there is any light, and then adjourn for dinner and come back at half-past seven or eight o'clock, and every one must speak when called upon. We have a museum and library, and some valuable additions have been made. It has social and clinical features, but the clinical is paramount to everything. The cost of admission is twenty dollars, with dues three dollars a month.

"We have three rooms on Union Square, and have a degree which is conferred upon those who have merited it. In the last year ninety per cent. of the attendance acquired it; ninety per cent. gave clinics. There were sixteen who attained the degree of F.S.C. and they were awarded the Fellowship degree. The post-graduate course or degree is the Fellowship, so that every one of the sixteen is a Fellow of the Stomatological Club of California, with the right to sign himself F.S.C.

"The membership is restricted to thirty, but out of that we have had an average attendance of twenty-five every Tuesday. These men give up their business. They come from Oakland, where they must leave the office at two o'clock, and San José, which requires them to leave the office in the morning, to arrive at San Francisco at three o'clock, and you can understand the enthusiasm of the sixteen who have received their parchment; not a single one has resigned from the club, so it is not the possession of the parchment, but the love of learning and their fellows which constitutes the great attraction."

DISCUSSION.

Dr. Burchard.—In consideration of the importance of the subject brought up by the report from the Council, touching some of the points that Dr. Younger spoke of in regard to the Stomatological Club of San Francisco, I move that we hold a special meeting for the discussion of these matters on the first Tuesday of January. It is a subject of importance, involving a change in the constitution, and I think we should hold a special meeting to discuss it.

Dr. Darby.—In seconding that motion, which I do most heartily, I would say there are many things we should talk over, and we have no time to do it to-night. It is the general feeling among those with whom I have talked that we want to make this Academy as useful as possible; we should have the room occupied more than it has been in the past. The object in securing these rooms was to have a place where the members could come and obtain informa-

tion, and with that view we decided to have clinics. I feel there is no reason why the rooms should not be occupied at least two or three days each month, where information can be given and exchanged.

There are many who want to come into the society who are debarred unless they conform to conditions which seem to them almost insurmountable. There are men already in the society who would be glad to give clinics; they are too retiring or modest to present papers, but they would give practical exhibits, and I heartily second the motion to meet the first Tuesday in January in order to discuss this whole subject.

Motion carried.

Dr. Kirk stated that the report of Council was simply its recommendation that the matter be considered by the society, and that it was so embodied in the report; that it was in no sense a ruling on the matter; simply a recommendation that the society consider the questions referred to.

Dr. Louis Jack, who was then called upon to read the paper of the evening, said, in introducing the subject,—

When some one suggested that the implantation of teeth would be a useful one to bring before this Academy, I agreed to make some presentation of it in order to facilitate discussion. I presumed that what I might have to say would be very short indeed, merely covering the general points of the subject, but I found, after I entered upon it, that it would be better to go over the whole field, omitting some details. I have dealt with it in a very simple and elementary manner, and have avoided as much of the technical language as possible, so that it would be comprehended by students as well as by ourselves.

(For Dr. Jack's paper, see page 133.)

Dr. Younger of San Francisco was called upon to open the discussion, and in response to the call, said,—

Mr. President and Gentlemen,—Somebody asked me a year or two ago if I had abandoned the implantation of teeth, and the reason he gave was that he had heard nothing from me for a number of years. I said the reason I had not written about it was that I had given it to the profession years ago, and was simply now waiting for time to show the operation as successful.

So far, my first cases are all intact. The first case I had was a young maiden, an Italian. This, to my surprise, remained in eighteen months. All her friends came up and shook the tooth and found it had become as firm as the others.

My next case was the 17th of August, succeeding. I planted five teeth, two of them on that day, the 17th, one a week later, one about the 1st of December, and the fifth one, a molar, on the year following. So that leaves four teeth that have been in four years, one over ten years, and one ten years about the first of next August, and they are all in perfect condition. A year or two ago, Dr. Daboll, of Paris, saw them, and he could not determine the teeth, or distinguish these from the original teeth.

There are quite a number of other cases that are from nine to ten years of age that are in excellent condition.

A week or so before I left, a lady visited my office and complained that the one I planted nine years ago was loose. I examined it and found what I supposed was a case of resorption of the root, so I made an appointment, and prepared a tooth for a case of transplantation; when I started in to remove it I found to my surprise a solid tooth. The one that had been planted nine years last April was in perfect condition. This shows that the operation is a permanent one; that is, if an operation will last ten years, you may look upon it as permanent. It promises in the case I have mentioned to last a lifetime, because there is nothing to indicate in appearance that there has been any absorption at all.

In regard to the operation, I would like to ask Dr. Jack how he makes his incision, because I think that is important in securing an artistic effect?

Dr. Jack.—I generally make the incision with the circular knife.

Dr. Younger.—In case there would be much absorption, that will give an unartistic appearance. I would like to show how I perform the operation to get an artistic result.

A lady went to New York for whom I planted four teeth. I sent her to a gentleman there who had performed this work a great deal and who makes a specialty of it, and I followed in three weeks. He said, "How do you do it? These teeth have been in six weeks, and I couldn't tell which of them you had planted." I said, "The thing ought to be done artistically." We want to resemble the teeth that grew there, otherwise I do not consider it artistic.

The majority of the profession look upon it as a thing to be dreaded. After the tooth has been thoroughly cleansed and all the substance removed, it is incapable of carrying infection. The only bacteria we have to dread is what is known as surgical bacteria. We don't care for the tubercular or syphilitic bacteria. Before performing the operation the mouth should be thoroughly sterilized,

even the tissues underneath the gum, with a delicate syringe, and the person should gargle his throat; if possible, make the territory of the operation perfectly inhospitable to pathogenic germs; then, of course, the instruments should be sterilized; the hands should be thoroughly sterilized, and the finger-nails especially, to see that there is no dirt; remove this with soap and hot water and then sterilize them. With all these precautions it is impossible for bacteria to infect the parts. Then after the operation every two hours the patient should sterilize her mouth, and it should be kept antiseptic as long as the wound is open. I think it is due to these precautions that I have met with so much success.

The doctor then proceeded to illustrate his operation by blackboard drawings, explaining the cuts as he made them.

Dr. Darby.—Do you inject cocaine into the gum, or etherize the patient?

Dr. Younger.—I inject cocaine.

Dr. Darby.—I don't know that I have any desire to relate my own experience, but I want to bear testimony to four teeth I saw in a mouth that Dr. Younger planted at least eight years ago. There were two centrals and two bicuspids, and had been in eight years. With one of the centrals resorption had taken place, and I was forced to replant another tooth in its place. His remarks in regard to artistic appearance I can fully verify: the appearance was certainly beautiful, and there was no recession of the gum present.

Dr. Younger.—A gentleman in the Confederate service, who had in a charge lost three centrals and a lateral, came to me for advice five years ago. He had no alveolus except at the very end of the root. In this same gentleman one of the laterals I implanted had two failures; with the third I had excellent success.

I had a case where a lady came to me to have a tooth implanted, a right superior bicuspid; this was nine years ago, and I defy any dentist to select that tooth by observation or by resonance. She had one tooth out, the second superior bicuspid, and another one was diseased at the root, and she decided to have that one out and one implanted, and I performed this operation four times before I succeeded.

Dr. Darby.—What do you think is the form of attachment between the tooth and the alveolus?

Dr. Younger.—I think there is a great deal of what I understand to be physiological tissue and pericementum.

The doctor was asked, How long do you leave your appliances on before you consider it a success or failure?

Dr. Younger.—In the course of a month or two months, if the tooth does not take hold, I take it out and put in another. If there is no attachment, of course it is a failure ; if there is attachment to the gum and the tooth simply remains loose, I consider that a success.

Dr. Jack was called upon to close the discussion, and in doing so, said,—

I have nothing further to say, except that I will open the cases I have here.

Here is a little box with a number of splints in it, and I have two teeth ready for implantation. After I have prepared my case I keep them in a disinfecting solution and cover them until the operation is to be performed. This case has been prepared two or three weeks. The splint is to be wired fast to the tooth ; there is an arrangement of the wire which is cemented fast. You will readily see that that form of splint makes a secure attachment in all directions.

Here is one prepared to take the place of a tooth lost by pyorrhœa, a bicuspid tooth.

The doctor referred to one or two other specimens and passed them around among the members for inspection.

Dr. Deane.—Before Dr. Jack closes, I want to bear testimony to a few of the cases that he kindly invited me to his office to see, and one point that struck me is his method of retaining the tooth in the mouth. It would seem almost impossible for him to fail with the retaining fixture in place. I saw one case where he had just removed the fixture, and it was impossible to produce any movement of the tooth, and that was a case in which considerable pyorrhœa had existed. An additional cause of trouble was that pyorrhœa extended throughout the mouth, and yet this tooth was immovable and thoroughly resonant; I could not tell which tooth had been implanted.

Dr. McQuillan.—Dr. Jack kindly sent one of his patients over to me, and I was delighted with the result; particularly in one case where there had been considerable pyorrhœa.

Dr. Jack.—When I secure suitable teeth, I preserve them in a mixture of glycerin and water, equal parts, in order to keep them moist.

Dr. Register then gave a black-board illustration of an appliance for increasing the power of the dental engine, which, in whatever position it was held, gave an unvarying result. The arm of the engine to which the appliance was attached was exhibited to the society.

Dr. Darby then called the attention of those present to the fact that a collation had been prepared and that all were invited to partake of it.

Adjourned.

George D. B. Darby,
Secretary.

NEW YORK ODONTOLOGICAL SOCIETY.

A regular meeting of the New York Odontological Society was held on Tuesday evening, November 19, 1895, at the New York Academy of Medicine, No. 17 West Forty-third Street, New York City, the President, Dr. Northrop, occupying the chair.

The minutes of the last meeting were read and approved.

Dr. Jarvie, of Brooklyn.—I have a pleasant duty to perform to-night, that of presenting to the Society a number of interesting and valuable instruments and appliances that were used in dentistry between forty and fifty years ago. They are presented to this Society by Miss Margaret Lowell Elliott, daughter of Dr. William Harvey Elliott. Dr. Elliott was born at Leicester, Mass., April 23, 1816. Studied at the Baltimore Dental College, and graduated from that institution in 1844. He began his practice at Plattsburg in this State, but in 1846 went to Montreal, where he continued to practise until 1856, when he gave up dentistry to continue his experiments and put to practical account his many inventions in firearms. His inventions were manufactured by the Remington Arms Company, and he continued with them until 1882, when, at the age of sixty-six, he went to Colt's armory, where he brought out his last firearm,—the lightning repeating rifle,—now being manufactured by the Colt's Company. Dr. Elliott died at Grafton, Mass., March 27, 1895. The instruments and appliances that we have here were nearly all made by Dr. Elliott himself. For ingenuity of construction and beauty of finish they cannot be excelled. In fact, although made by an amateur, I think it would put to the test the finest dental mechanism we have to-day to make instruments as fine as these are. Many of them are decidedly original, and something very similar is being put on the market to-day as new; yet this gentleman made them forty-five years ago. I think the Society is very much indebted to Miss Elliott for this disposal of many of her father's effects. I hope this will be the beginning of a large collection of such things. The evolution in dental appliances has been

so rapid and has taken place in such a short space of time, that we almost forget the appliances that were in use not very long ago. I think we could get together from among the members of this Society quite a collection, and one of great interest to the student of dentistry, if each one contributed something of interest that he has in his possession.

Miss Elliott also presents to the Society her father's diploma, which was issued in 1844, and is among the first dental diplomas issued in this country; also a certificate of membership, on parchment, issued in 1842, in the American Society of Dental Surgeons. I offer the following resolutions:

WHEREAS, Miss Margaret Lowell Elliott having presented to the New York Odontological Society the two diplomas of her deceased father, Dr. William Harvey Elliott, as well as a large number of instruments and appliances used by him, and almost all of them of his own invention and made by himself; therefore,

Resolved, That the Society appreciate the gift as a valuable addition to its museum and as an evidence of the skill and ingenuity of one of the pioneers of dentistry in the United States.

Resolved, That the thanks of the Society be tendered to Miss Elliott, and a copy of this preamble and resolutions, properly engrossed and signed, be sent to her.

I am glad that Dr. John B. Rich is here to-night, for he knew Dr. Elliott and saw some of these appliances forty years ago.

Dr. John B. Rich, of Washington, D. C.—Mr. President, it gives me great pleasure to second that motion, for I was present when many of these beautiful instruments were exhibited to our profession by Dr. Elliott at a meeting held in New York over forty years ago.

Dr. Elliott was one of the best mechanicians I have known. These instruments were of his own invention and manufacture, and in beauty of form and perfection of finish they far excelled the production of any instrument-maker of that time. But the most remarkable feature about them was the intelligent ingenuity displayed in the construction and adaptation to the purpose for which they were intended, and in this particular they excited the most profound admiration from all who examined them. Almost every one as it was produced and its purpose explained elicited exclamations of astonishment at its ingenuity. I cannot give you any idea of the enthusiastic admiration their display excited. Dr. Edward Maynard, who was a most ingenious inventor, was paying me a visit at that time, and was present at the meeting and joined in the

enthusiasm about them. After the meeting where they were exhibited adjourned, Dr. Elliott brought them to my office, and there he explained to Dr. Maynard and myself the purpose for which they had been constructed more in detail than he had been able to do before the meeting. We spent the greater part of the evening in this critical examination of these beautiful instruments, and when we had finished Dr. Maynard declared that they were the most ingenious adaptations to a purpose he had ever seen.

I recognize among these instruments one of my own invention, which Dr. Elliott made a drawing of on the evening I have mentioned. At that time artificial crowns were attached to the natural roots by means of compressed wooden dowels; when these crowns broke or became loose on the dowel, it was often very difficult to remove the dowel from the root, particularly if the periosteum was inflamed. These forceps were designed to remove the dowel without interfering with the periosteum: the protruding end of the dowel was grasped with the forceps, and the short end of the lever which is pivoted to the forceps was brought to bear upon the end of the root, and by this means the dowel was quickly removed, and without causing the roots to be forced into its socket.

I think these instruments are a great addition to the museum of this Society, and that we owe Miss Elliott our warmest thanks for presenting them to us.

INCIDENTS OF OFFICE PRACTICE.

Dr. C. S. Stockton.—I have had an incident of office practice,—one peculiar to myself. We all have speculated more or less concerning theory and experience. We, as dentists, no doubt have speculated and spent hours in solemn reverie concerning toothache. When a patient, with woe-begone expression and a look as if all hope had departed and the last friend gone, has presented himself, we have wondered what toothache really was and what it was like. I have had experience.

Some time since I had an approximal cavity in a lower molar filled, and the filling was contoured in such a way as to leave a pocket for the lodgement of food, the consequence being that decay increased and it was always a source of trouble and annoyance.

During the summer vacation, spent at home, an occasional gentle reminder was given that attention was required; and so I "trolleyed" to this great city of great dentists. Finally, I found one. His tone was kind, gentle, and assuring, and I found myself seated in a newly and elegantly upholstered chair. Soap and water were

freely used, and finger-nails scrupulously cleansed and the hands delicately perfumed. And then the boring and the cutting began and continued; and, finally, a diagnosis made that the cavity in one tooth was dangerously near the pulp, and in the other he thought the pulp was dead. He, however, would fill and bridge with gutta-percha temporarily, and if I had any trouble his assistant would attend to me, and with a Chesterfieldian benediction I was on my way to Jersey again, toothache banished, confidence in and respect for my dentist swelling with every heart-beat.

Thus the days and the nights passed until the hot Thursday. The live pulp or the dead one had evidently felt the state of the thermometer and sympathized with it, and so ice was applied and the pulp soothed until dinner was served and the hot soup touched it, and then,—well, I thought it was too hot to eat. I used Darby's dental plasters, hot water bags, ice-bags, pain-killers, whiskey, externally and internally, and yet the pain grew and the tooth with it. Early in the morning a neighboring dentist was sought. Soap and water were not used, and the nails were not cleansed, and the hands not perfumed. No, the time did not permit these delicate attentions, because we wanted a hole in that tooth quick, very quick.

The moral of all this is: Never have a tooth contoured so as to pocket food, and the conviction is firm that theory is better than experience, when toothache is your own.

Dr. William B. Davenport.—I wish to describe and exhibit a little mechanical device, which was made to be permanently attached to the lower incisors and cuspids of a patient whose teeth had become exceedingly loose from tartar and consequent disease of the gums. Certain restrictions had been put upon my efforts by the patient, as, for instance, a demand that whatever I made for him should have no clasps, that it should not annoy the tongue, and that it should not show, and I think the result which I hold here and which is a model of the piece inserted, quite interesting and helpful to others.

Having tied the six lower front teeth together with silk, an impression of them was taken with moldine and a cast obtained with Melotte's metal. A strip of pure gold thin enough to be burnished into place with hand instruments was applied to the lingual surfaces of the teeth on the cast. It covered the upper half of the teeth, curving very slightly around onto the sides of the cuspids, and not quite coming up to the cutting edges of the whole six. The cuspids were firm, but the incisors very loose, which prevented mastication to a great extent. This strip of gold, after being perfectly fitted as

described, was strengthened with solder filings, and then pierced with a drill in six places to correspond with holes already made in the teeth, and large enough to admit threaded platinum pins of the size of those in plate teeth, from one-eighth to three-sixteenths of an inch long, as the thickness of the teeth would allow. All the teeth were alive, but the drilling, which was done with the right-angle handpiece, was accomplished with comparatively no pain, as oil of cloves was used constantly and no pulps were exposed. The drill-holes were above the pulps in each instance, but as near to them as was safe. The alignment of but one pin at a time with its two drill-holes in gold strip and tooth was obtained at a sitting. A drop of wax held the pin securely to the gold, as it rested in position in its hole in the tooth and permitted the removal of the piece without bending the pin. Investing and soldering followed, and was performed six separate times. Finally, the strip of gold plate holding its six pins was set into the teeth with thin oxyphosphate of zinc, and allowed to remain thirty minutes (the dam having been previously applied) before allowing saliva to touch it. It has now been worn with comfort over two weeks, and mastication is performed without trouble.

The secretary read a communication from Philadelphia, inviting the members of the Society to celebrate the fiftieth anniversary of the organization of the first dental society in that place.

Dr. Thomas, of Philadelphia.—As chairman of that committee, I would say that we would be glad to have you come to meet us at that time. Philadelphia is getting to be quite noted for celebrating fiftieth anniversaries, and we would like to have as many as possible come and meet us on that occasion.

The President.—This appears to be a very joyous celebration of our Society, when we look around and see so many friends. Philadelphia has sent a good representation, and we have also with us to-night representatives from Washington, Boston, New Haven, and other cities. We regard it as a compliment, and we extend to all present an invitation to take part in the discussion and the deliberations of the evening as freely and as frankly as if they were in their own societies. Gentlemen, make yourselves at home. We are happy to have you with us, and shall regard you as members for the time being.

The paper of the evening, by Dr. George D. B. Darby, of Philadelphia, will now be read. It is entitled "Is Uric Acid an Important Factor in Dental Diseases?"

(For Dr. Darby's paper, see page 143.)

DISCUSSION.

Dr. Burchard, of Philadelphia.—It appears to me that this question of the association of certain dental disorders with the gouty diathesis has passed the stage of hypothesis; I think it has reached the stage of actual demonstration. It must be evident to every one who studies this subject and reads the literature on it that many of these cases of erosion and phagedenic pericementitis are not also affected by what is described in the text-books as "classical gout." There may be no evidences of joint-trouble or of a family history of gout, and therefore it seems that this is a question for the general pathologist to dig into again, to determine the exact mode of origin and action upon cellular structures of uric acid. I have seen myself cases of erosion where no gouty history could be elicited at all, beyond the patients suffering from a variety of disturbances beginning with affections of the alimentary canal, and in others disorders of the liver, in the lungs, in the kidneys, and in the blood-vessels. All these organs are concerned in the oxidation of the blood which supplies the tissues, or in the elimination of waste products, and so, owing to disease of any of them, there may be faulty oxidation at given points. After the pabulum has reached certain cells, there is an oxidation of the food in those cells. There are two beliefs in regard to the origin of uric acid itself: one that it represents a midway oxidation between product xanthine and urea, and gout is, therefore, attributed to the accumulation and retention of a product in insufficient oxidation. A substance urea that should be excreted by the kidneys is replaced by a substance which is not perfectly excreted by the kidneys. In regard to this question of the presence of an excess of uric acid, it has been held that the active cause of gouty manifestations was an excess and retention of uric acid (urates) in the circulating fluids. Ebstein's theory is that there is a necrosis of the tissues in an area, which area acquires an acid reaction, the uric acid, which is insoluble in an acid is deposited in that area. Within the past two weeks, Dr. George Gould (*Medical News*, November 2) calls attention to the investigation of a German pathologist, who demonstrates that the amount of uric acid formed is but a secondary factor, a local cellular debility, possibly caused primarily by a variety of intestinal troubles,—the first the underlying cause of the presence of an excess of suboxidation products. In regard to erosion being caused by an excess of uric acid, I think that Dr. Kirk's and Dr. Edwin T. Darby's cases, reported several years ago, show without doubt that there is an association between erosion and

the gouty diathesis. It is recognized that the majority of cases of erosion occur in teeth that are not susceptible to the carious process. I do not say they are hard teeth, but they resist caries. It is the type of teeth found affected by pyorrhœa alveolaris. For my part, I have always regarded that kind of teeth as the product of a form of higher organization, this due primarily to the uric acid diathesis, that the teeth become progressively more organized with age, and that the presence of the excess of uric acid in the blood or circulating fluids had a causal relationship with it. In regard to Dr. Peirce's view of the exact mode of the deposits of urates, it appears to me that it contains an error; he resolves it into a question of mere physical subsidence,—that is, a fluid in a state of agitation will hold in suspension certain particles, and when the fluid is at rest these will deposit. According to Ebstein's idea, that preceding the deposits there is necrosis of an area, it seems rational to suppose that preceding the deposit of these salts on teeth there is the death of a portion of the pericementum, an acid reaction is established in the necrotic area, and the urates insoluble in acid are deposited there. As far as the dental troubles are concerned, I think this question of the dental diseases, associated with the dyscrasia, has reached the stage of actual demonstration, and we must now turn to the general pathologist to give us a better definition and conception of the intimate nature of gout, and of the diseased processes, the various disorders that begin with indigestion and end with acute gout, and the relations between them.

Dr. L. D. Shepard.—Like others, I came to learn rather than to instruct. Uric acid has a double interest to me, as a dentist, and as a sufferer from gout since 1889.

I have enjoyed the instructive paper and congratulate the essayist on the success of his effort.

I have recently had a case which may be of interest to relate. The family has been under my care for twenty years. The father's teeth have required a good deal of filling, but the mother's teeth were very poor, and she died some years ago from consumption. The five daughters, ranging in age now from fifteen to twenty-three years, are highly organized, nervous, and intellectual, with teeth which, previous to the days of Dr. Black, we should have called decidedly below par, and yet, thanks to a most scrupulous care of the teeth which makes them my model family for cleanliness, they have had almost no proximate decay, nearly all of their fillings having been in the sulci. On June 23, 1894, one of the young ladies, aged about twenty, came to me complaining of extreme

sensitiveness of the teeth, particularly at the necks of the bicuspids and the buccal surfaces of the molars. I found a number of softened and extremely sensitive places of commencing caries near the cervical margins. Upon testing I found the saliva decidedly acid. This condition was new, and in a patient who had previously only two proximate fillings, while about all the sulci of the molars had been filled, those of the first permanent molars having been inserted at eight years of age. I advised her to use an alkaline wash, and to see the family physician to test the urine. I suspected from the conditions of the teeth and saliva, although she claimed to be in perfect health, an excess of uric acid. A few days later she reported that this was so. On her next visit, November 17, six months after, I found the saliva still acid, and then learned that her physician had given her no constitutional treatment according to my view. All he had prescribed was a change of diet, and one of the waters to drink. He is an old man, of great experience, very eminent and wise in his day, but not up to the times. About this time I filled several buccal cavities, and advised more direct treatment for uric acid. I gave her for local use a powder, adding to my regular tooth-powder tannic acid one ounce to the pound. She has been in my office since I received the notice of this meeting, and during the past summer has had efficient constitutional treatment, with the result that the sensitiveness is all gone, and the tone of the mouth changed. All she could tell me of the treatment was that she took what her new physician called Dr. Austin Flint's prescription.

I thought this case of sufficient interest to report to-night, and so looked up my records to be accurate in dates.

The essayist has quoted liberally from Haig. While his writings are fascinating, it should be stated that his views have not been universally accepted. Many of his conclusions strike me as correct from their coincidence with my own experiences. You will remember that he was a sufferer from uric acid in the form of terrible headaches, and founded much of his deductions upon personal experimentation. In accordance with the theory that uric acid is stored up during cold weather, and eliminiated by the profuse perspiration of the hot season, all of my severe attacks have occurred in the early spring, and at a season, as he says, of increased arterial tension and lowered nervous force. He gives the preference to the alkiline salts for treatment, particularly salicylate of soda. For me this medicine is a specific, and I have it always with me. My attacks yield rapidly to it, so that I can discard my crutches in a

couple of days. He does not consider lithia as effective as some, claiming that, as a result of its exhibition, uric acid is stored up, and hence that the urine tests are deceptive. A very suggestive remark of his is that laboratory reactions are not reliable bases for the reactions in vital processes.

Last winter I was fascinated with the taking advertisement of the new preparation of lithia spoken of by the essayist, which is very palatable, and I submitted myself to that treatment during the winter, trying to escape my spring attack. I used it as a prophylactic, thinking I should get through the spring all right. It was followed by the worst attack I ever had. The agent of the preparation tells me I should have taken it in hot water; perhaps I did not take it in the right way; I took the right quantity just before my meals, also on retiring, but not in hot water. I have been in the habit of taking about six pints of water during the day to flush the system.

Descended as I am from particularly pious ancestors, who were leaders in the temperance reform before temperance reform was fashionable, and always having been temperate myself, I have wondered why I should have had a gouty tendency. The probable solution is the fact that to offset the growing portliness, for some years, commencing about fifteen years ago, I adopted a moderate, not extreme Banting system of feeding, increasing the consumption of beef, and decreasing that of vegetables. I have no doubt now, in reviewing the matter, that my gout is the direct result of this diet.

The essayist endorses the theory that uric acid is the cause of pyorrhœa. I was present at the first demonstration of Dr. Riggs in regard to the surgical treatment of pyorrhœa, which before his day was practically unrecognized by the profession. I have watched the course all through. I had Dr. Riggs some twenty-five years ago in Boston to treat cases there, and knew his treatment thoroughly. I must say that of all the children who have been my patients and have grown up under my hands, whose teeth have been taken care of, and proper attention given to cleanliness, I have yet to see a case of pyorrhœa alveolaris. I do not think it possible for a child who is in the hands of a competent modern dentist, and whose teeth are kept clean (which means free of any deposit which can be reached by the instruments) to have any manifestation of pyorrhœa, no matter how much uric acid that person may have in other respects. I have not spoken on this subject before, although I have been asked to do so. I am still a believer from my experi-

ence in my office that this disease proceeds mainly from the outside and not the inside. The hopeless cases I do not wish to speak of, because they are past all practical recognition of their etiology; for in dealing with etiology you must deal with the commencement of disease,—the mild cases and not the severe ones. I have seen in children, of twelve to fifteen years, what I regard as the commencement of pyorrhœa. I have removed that with a very gentle surgical operation, and by keeping the teeth clean, twenty years after there has been no manifestation of the disease more severe than the first manifestation which I had relieved. So I cannot, from my experience, accept the theory that the origin of this manifestation is uric acid.

Dr. Rich.—This subject of uric acid being the cause of disease in the general system has been a matter that has attracted my attention for quite a long time. For many years the matter of erosion was a mystery to the profession,—that is, its manifestation in the particular portion of the tooth where it occurred. In many cases the peculiar shape that it took, and the highly polished surface of the parts that were denuded, was a matter that was really a mystery. Nobody seems to offer any solution for that condition. Some years ago, in conversation with a friend upon this subject of erosion, of which a great many cases just at that time happened to come under my observation, he suggested that it was an acid secretion from the margin of the gums, and upon my asking him why he thought that was the reason, he said it could not come from any other cause. Upon asking him how he accounted for the highly polished surface, he did not make any satisfactory answer. About that time I collected a great many casts of erosion, many of which presented the most beautifully polished surfaces, even when examined by the microscope. In some cases the erosion extended through at least three-quarters of the tooth. This was a mysterious condition, and one of which there was no apparent solution. From the many people to whom I showed these casts, there was no satisfactory explanation. The smooth, beautifully-polished surface was against any idea of corrosion by an acid. It seemed to be impossible. At first it was attributed to the action of tooth-powders and stiff tooth-brushes, and that was the accepted theory for twenty-five or thirty years after I commenced practice; but this often occurred in my practice where there was no hard tooth-brush used, and where the people did not use the motion that would produce this condition, because my instruction to them was that they should always use the brush with a rotary motion, and never

with a motion across the teeth. This peculiar rotary motion could not produce that condition. Finally, a gentleman who was badly affected, spoke to me about it. I asked him how he lived. At that time I was devoting a great deal of attention to hygiene and the physical training of the human race.

In one particular case, where erosion occurred in a lady who was one of my patients, I said to her I did not think she took enough physical exercise. I advised her to join a physical culture class, and she did so. This erosion had progressed in the surface of the teeth possibly one-eighth of the distance. She commenced as a pupil at the school, and I took an accurate cast of her teeth where they were eroded. After six months I took another cast, and there was no perceptible increase, and her general health was improved. She stayed in that school four years, and there was no recurrence of the disease at the time she went through this system of training. That lady was not wealthy enough to ride horseback, and did not have much opportunity for exercise, and besides, she was one of the persons who had to be compelled to exercise in a class to get the amount of exercise that was required to keep her in health. About a year after the school closed I noticed that this erosion had commenced again in her teeth, and it progressed until the erosion had worked half-way through the teeth. I had casts of that case taken in wax at that time. This lady's case led me to the conclusion that those cases would not occur in persons in a good state of health. My practice at that time lay almost entirely among the wealthy people, who take the least exercise of any class of citizens, and I found that in those persons who exercise the least, when this erosion once started, it was most rapid. I came to the conclusion that it was want of proper physical tone and the want of exercise that caused it. I made observations on people who were engaged in laborious occupations, and did not find any erosion. However, the immediate cause of erosion was still a mystery. Five or six years ago, the subject of uric acid was mentioned by one of my patients who was a physician. He thought that uric acid was the cause of many diseases of the human system, among them diseases of the teeth. I asked in what way, and he said he did not know particularly, and asked me to tell him some of the diseases of the teeth which we are called upon to treat. Among other things I spoke of the prevalence of Riggs's disease, as it was then called, and four or five months afterwards he said he thought the disease was the result of want of proper physical exercise. He said he should not wonder (and I

think this was almost prophetic on his part) if it were found to be an excess of uric acid in the system. He said he had a patient who was badly troubled with erosion, and who deposited large quantities of uric acid from the urine. He said he would bring that patient to me for treatment. Having been an enthusiast on that subject, I knew pretty well how to examine a man as to his physical condition, and I found that this man was a large eater and a large consumer of meat and beer, and took very little exercise. He was a stock-broker. Almost all the carbon that was generated in his system was used in his brain in his business, and this trouble was evidently caused by uric acid. Still, I could not say that this disease of the teeth—erosion—was caused by uric acid. Quite a number of cases of erosion occurred,—one of them a very peculiar case,—which went nearly three-quarters of the way through the tooth, and past that portion where the pulp-chamber was, and, upon examining it under the microscope, I found a secondary deposit of dentine on the surfaces, which were highly polished. I have those casts to-day, where the wax is as perfectly polished as if it were taken from glass.

Dr. Louis Faugères Bishop.—The theory of gout has been brought up in the discussion, and a great many very vague views have been touched upon. A year ago I was asked to read a paper before the medical section of the New York Academy of Medicine on gout. I went over the literature of the subject, and was very much dissatisfied; then I happened to run across the Croonian lectures of Sir William Roberts, with an account of his experiments, and his conclusions convinced me so much of their truth that for my part I have given up all the others. Those theories are so little known that I think five minutes spent on the subject will be well employed.

Sir William Roberts first began his experiments with amorphous urates, with which we are all familiar. It is rather remarkable that previous to Roberts's investigations, no one had ever determined the chemical composition of those urates. We believed that they were a mixture of urates of ammonium, calcium, sodium, etc. But decomposition had taken place in the urine. Roberts examined the urine in the fresh state. He found that urine that had been standing very soon decomposed, and a reaction took place between the acid phosphates and the alkaline phosphates, and deposits of uric acid resulted. He found that the amorphous urates were of uniform chemical consistency, and were a chemical combination known as a quadriurate, a more complicated salt

than the sodium urate. It has four chemical bonds which are satisfied by hydrogen and some base. Roberts then worked out the fact that uric acid circulated in the blood normally in the form of this quadriurate, and this was the natural form in which the uric acid always circulated in the blood. It has been known from time immemorial, since the time of Scheele, that the deposits of gout are sodium biurate; that is a simpler form than the natural form of uric acid in the blood. Roberts demonstrated by scientific experiments that what occurs in gout is the change of the uric acid from the natural quadriurate to a simpler salt, the biurate, and this change takes place when any condition exists which renders the biurate less soluble. Roberts experimented very extensively upon the solubility of the sodium urate,—that is, the form in which the uric acid is deposited in the joints and probably on the teeth. We talk a great deal about uric acid, but uric acid. as such, does not exist in the blood. It cannot. The blood is an alkaline fluid and it is not possible that an acid should exist in it. I have only seen one case where the blood became acid, and that was the case of a child who had diabetes, and the child died within a very few hours. That would happen to any of us, if our blood became acid. We speak of uric acid, but it really does not exist in the blood nor in the urine when it first escapes into the kidney; but it is a product of the decomposition of urine, which may occur after it is voided. Roberts worked the solubility of sodium urate. He found that this was influenced not so much by the acidity or alkalinity of the vehicle in which it was dissolved as by the salts contained in solution. He found that the solubility of sodium biurate is as follows:

In pure water at 100° F. about one part in one thousand.

In water containing one-tenth of one per cent. of sodium bicarbonate the solubility was diminished one-half and progressively diminished as more bicarbonate was added.

The same principle was borne out by experiments with sodium chloride, sodium sulphate, sodium salicylate, and sodium phosphate.

On the other hand, the effects of different quantities of potassium chloride were very slight. Calcium salts also diminished the solubility of the sodium urate.

Therefore, we can draw the conclusion that the administration of sodium salts (common salt is sodium chloride) would have a bad effect on gout. Some physicians have told me that they demonstrated this. It would be a point worth working out, to determine

whether the use of salt has any effect on the deposits around the teeth. I would recommend to your Society this work of Roberts.

As to the treatment of gout, there is really no specific treatment. The work and experiments of Haig are of extreme interest clinically, and he is a most fascinating writer; but I do not think his theoretical conclusions are quite borne out. We rely chiefly in the treatment of gout upon making the patient take large quantities of pure water without any salts at all. As you can see from Roberts's work, mineral waters are worse than Croton water, as the salts do harm, especially the sodium salts. The potassium salts do less harm. If any drug is useful, it is potassium salts, because the potassium salts, replacing the sodium salts, would increase the solubility of the sodium biurate. We rely on hygienic measures, supplying the system with a sufficient quantity of water to carry on the chemical actions easily. We have very little confidence in any one drug, but would recommend citrate of potassium as useful as any. It is more a question of regulation of life and sound common sense. But when we dismiss the treatment of gout thus summarily we must not think that it is an easy matter. It is in the treatment of these conditions that the patience, knowledge, and skill of the physician is tested. It requires little thought to stop chills with quinine, but to so manage a gouty patient that he will not suffer from gouty symptoms is a triumph of the highest medical art.

Dr. Louise Fiske Bryson.—It is a great privilege to be here and listen to the paper and the discussion. The reader of the paper spoke of the trouble not occurring until between the ages of thirty and forty years. My work happens to take me part of each week into an ideal school, where there are about three hundred and fifty pupils. These children are measured and weighed and carefully examined. I make measurements and physical examinations of the girls four times a year, and owing to some early training I have had I consider the condition of the mouth very important. The children's teeth are very carefully examined, and the structure of the mouth noted, and I find quite a number of children with erosion, and they do not come from the wealthy class either. The high arched palate that was called to our attention recently exists with what I have taken for erosion and with tubercular tendencies, and one instance I would call to your attention. A child seven years of age, who had the front teeth just appearing, had very suddenly an abscess of the liver, which is said in many text-books never to occur in children. It is a very serious condition. The child was not well for a whole year after, although the abscess was

cured before that time. The second teeth came in riddled with imperfections, and before that child was ten years of age there were specimens of the most beautiful dentistry in that mouth. There was a case which was probably not due to entirely uric acid diathesis, because that extraordinary condition of the teeth existed at such an early age. I have observed the fact that the teeth were not decayed. I would like to ask whether it is due to uric acid or to the retention of urea.

With regard to Dr. Haig, I think Dr. Christian Herter has certainly shown that Dr. Haig has the cart before the horse very often. It occurs to me that that question of how far the retention of urea might affect the teeth would be a very interesting one to investigate. I shall be extremely indebted to any gentleman who could enlighten me as to this child. I must thank the essayist personally for his very interesting and charming paper.

The President.—Dr. Goddard, of California, is with us this evening, and has a few words to say before we adjourn.

Dr. Goddard.—In the summer of 1894 there was held in San Francisco the first dental congress of the Pacific coast. We had delegates there from all over the State, from Oregon and Washington, and the East was also slightly represented by one gentleman from Chicago, one from Philadelphia, and one from New York. Our total attendance was between two hundred and fifty and three hundred, which we considered very good, considering the scarcity of dentists on the coast. At this congress a preliminary committee of five was appointed to take charge of the matter of another congress in 1896 or 1897. This committee organized last summer, and at a recent meeting it was decided to hold a Pacific Coast Dental Congress in August, 1897, and as chairman of that committee, I wish to extend a cordial invitation to you all as members of this Society, and individually, to attend this congress in San Francisco. The American Dental Association and the Southern Dental Association will be invited to hold sessions jointly with ours, or separately, if it may seem best.

A unanimous vote of thanks was tendered to Dr. Darby for his able paper, after which, there being no further business, the meeting adjourned.

JOHN I. HART, D.D.S.,
Editor New York Odontological Society.

Editorial.

THE PARASITE IN SCIENCE.

Among the lower forms of life, bacteriology informs us, are to be found the saprophytic bacteria, living solely on dead matter, bringing into active work new elements, which in turn develop new forces, and make possible the constant increase of animal and vegetable forms. "Deprive higher vegetation of the carbon and nitrogen supplied to it as a result of bacterial activity, and its development comes rapidly to an end; rob the animal kingdom of the food-stuffs supplied to it by the vegetable world, and life is no longer possible." These, then, are the beneficent forms of lowly life. They constitute the largest number of bacteria upon the surface of the globe. There exists another class that live a parasitic life, feeding on living organisms and constituting the forms which go to make up most of the diseases described in our pathological works.

This illustration from the forms lowest in the scale of life is characteristic of all stages of existence, from the flora in the forest to the fauna in the African jungle. Man, with his usual lordly assumption of superiority, ordinarily regards these with contemptuous indifference, but realizes growth or death, through their influence, equally with more humble creations.

That which is true in the physical world seems to be equally true in the mental, and the more we attempt to examine the psychical phenomena are we impressed with the remarkable similarity and universality of the laws governing each.

Life and death are the active presentations in all physical existence; the beginning and the end of organized being. The child grows to the man, and the man to old age, and then comes disintegration and death. First the active life-force combating disease; then the period of weakness, the increased activity of parasites, followed by death; and then the beneficent work of the saprophytic bacteria, bringing the dead matter into new forms. Thus may be classed the orderly arrangement of physical life, and the most critical cannot find any fault with it. It is all necessary for the prolongation of the activities of the world, and without it the wheels of progress, in a physical sense, would cease to move.

While man has the power of reasoning and voluntary movements there would seem to be a limit to the action of this law, and that it need not be extended to the mental processes. The products of the human intellect are not supposed to die, nor to require a mental saprophyte to bring them into new forms. The mental labor of the world lives in its creations, and upon these foundations other mental superstructures will continue to be erected.

It is difficult to understand why man should imitate the lower vegetable and animal forms, unless this comes through the hereditary taint of evolution, but we do know that in one particular at least the parasitic tendency lives with the race, and that with a pertinacity that would do credit to a more worthy object.

We have had the plagiarist with us from time immemorial, and we have repeatedly called attention to this blot upon our profession, but the subject is by no means exhausted, for the plagiarist is still a living factor among us, stealing the work of the brains of men and doing all the harm possible in his worthless career. It is not with him, however, that we wish at present to deal, but with one very near in kinship,—the parasite of original thought. It may seem strange that any distinction should be made between the two, the plagiarist and the parasite, but when the result of the work of these two is analyzed it will be found that, while the effects are practically the same with both, the method of work is quite different. The plagiarist fastens upon the completed work and takes it for his own, and with a few alterations, or none at all, as may suit him best, starts it again upon the world under his own name. The scientific parasite is one who is ever on the watch for original ideas from other men. He does not possess the power to generate these in his own mental organization, and hence must seek pabulum elsewhere. With a keenness of vision which does him infinite credit, he will discover an original thought not observable by other men. This, once caught, is taken and elaborated, and in its new dress is spread before astonished audiences as a fine piece of original work. If the originator of this idea be mentioned at all, it is in such an indifferent way that the glorious halo around the new aspirant for favor is not in the least dimmed. We are constantly reminded in our professional reading of the efforts of some to appear great on the capital furnished by others. The evil would not be so serious if these men would be as frank as Edison when speaking of the Roentgen process; that while all honor was due the discoverer, he proposed to try and make it a commercial success. In the case of Roentgen no amount of parasitic work can

destroy or even affect the great results attained by the discoverer, and hence the changes rung upon it, and the efforts to advance, through the activity of many minds, will only result in good.

This, however, is not true with a large portion of the world's work. The parasite is ever with us, and almost all original investigators suffer by his detestable presence. Dentistry is full of this class. While this profession has probably more original workers than any other, it has in its ranks an equal proportion of men more or less intellectually gifted who have made their entire reputations upon the faculty possessed by them of taking other men's work, repeating the experiments, and then boldly giving it all out as practically new. We think it is time that the dental profession should place its mark of condemnation upon these, and let the plagiarist and the parasite in science go down into oblivion together.

DR. WILLIAMS'S CRITICISM.

It is, probably, quite as gratifying to an editor to find his articles antagonized as to receive commendation. In both cases it is quite evident the object of writing has been attained: that of impressing two classes of mind, the resulting effort being the eventual establishment of the disputed question upon a truthful foundation.

The editorial that has called forth this hurried criticism of Dr. Williams was not intended as a scientific essay; in fact, was not desired to be more than all editorials should be,—suggestive. The readers of journals are supposed to be intelligent and fully capable of doing their own thinking, and it is not for any editor to burden his special pages with tables of experiments or illustrations. All editorial writing must therefore be "extremely lame," as Dr. Williams phrases it.

We have not the space to reply to his somewhat dogmatic assertions, nor would we deem it necessary at this stage of the controversy. His premises may be, and probably are, based on actual investigations, and we wait with some impatience the production of these facts. It may, however, be said that our limited practical knowledge of microscopical work, extending not more than something over three decades, does not enable us to understand how Dr. Williams can prove by this method that the "decay of the teeth is not primarily dependent upon the exact amount of lime

salts which they may contain." This is not made clear in his criticism.

It now belongs to him to show that Dr. Black's generalizations, founded on experiments, can all be sustained by the microscope. When this is done the readers of this journal will be better prepared to answer, in their own minds, without our aid, whether it is better to fill children's teeth from twelve to fifteen with gold or wait for years to give the increase of density demonstrated to take place by Dr. Black.

Will Dr. Williams, in his forthcoming articles, explain why a gold filling will devitalize a pulp in so-called soft teeth, and may not in what are termed dense teeth? Why in some teeth caries comes to a full stop, with the result of an ebonized surface (eburnated dentine)? Will he explain why the environments should destroy certain teeth so rapidly as to expose the basis-substance, and not affect certain other teeth in other mouths with, apparently, similar environments? Why pitted teeth rarely decay in the depressions? Why some teeth are so dense that they readily give off sparks, like flint, under the excavator? Why some children at twelve have pulp-nodules, and in others the dentine will cut like old cheese? These and many more problems connected with this subject await solution, and, while the writer has held and taught certain hypotheses regarding these conditions, we want facts. Can Dr. Williams, through the aid of the microscope, answer these interrogatories?

DR. W. H. DWINELLE.

In the death of Dr. Dwinelle, which took place at Cazenovia, New York, February 13, 1896, the dental profession has lost one of its most prominent leaders. If dental literature be examined for the past fifty years, few names will appear more frequently and almost always connected with an original idea. In fact, many of the so-called new things in practice will be found to have had their origin in his prolific brain. In a period of selfish exclusiveness he was generous with his original ideas, giving these as freely as he was open-handed and open-hearted in other directions.

Dentistry should reverently hold in memory such a man, for truly there will not soon be seen again one more worthy of high regard.

He lived beyond the period usually allotted to humanity, and his co-workers can part with him, as we must part with all, conscious that the reputation he made and the good he did in his life will live as long as men read and appreciate the work of the fathers.

A full account of his life and work will appear in the next number.

Foreign Correspondence.

REPLY TO THE JANUARY EDITORIAL.

To the Editor:

Sir,—I have just read the strictures on Dr. Black's recent investigations which you contribute in an editorial in the January number of your magazine. I am glad to see the discussion of this most important subject opened by one who, like yourself, has decided opinions. Although I disagree almost *in toto* with your conclusions, yet your point of view leads you to seize upon the most significant aspects of Dr. Black's work, and thus to set clearly before your readers the points at issue. During the past two years I have been engaged in investigations in this same field of research, and although my work has been entirely confined to such methods as may be conducted by the aid of the microscope, I find that my conclusions, as far as reached at present, are largely in harmony with those of Dr. Black. And it appears to me, Mr. Editor, that while the facts which you state are above reproach, as, for example, that some teeth decay much more rapidly than others, and that metal fillings are not always the best for children's teeth, yet your reasoning upon these facts is extremely lame. Whatever direction our theories may take with reference to caries of the teeth, we have to keep them within the broad lines of facts as known. Now, I consider it a firmly-established fact that slowness or rapidity of decay of the teeth is not primarily dependent upon the exact amount of lime salts which they may contain. Foremost in the evidence in support of this position must be placed the facts, reached both by microscopic investigations and by analyses, that normal mature enamel[1] contains *no appreciable* per cent. of true organic

[1] By "normal enamel" I do not mean what might be called *average* in liability to decay, but normal in structure from the stand-point of the histologist.

matter. This was practically the position taken up by Drs. Black and Sudduth and myself during the discussion of the paper which I read before the First District Dental Society of New York, December 9, 1885. My recent investigations have confirmed this view, and it has been still more completely established by a recent analysis of enamel made by Mr. Charles Tomes. From my knowledge of the methods employed by Mr. Tomes, I believe the analysis to have been the most careful and accurate ever made. In twenty grains of enamel he found no sufficient quantity of organic matter to weigh, probably, less than 0.1 per cent.,—and even this small quantity might be entirely extraneous. If there be *no* organic matter in enamel, then there can be no question of greater or less liability to caries because of a greater or less quantity of that which does not exist.

But this is only one line of argument in support of our position. When we come to examine the enamel of the teeth of some mammals and fishes we find a more or less elaborate organic structure in it. In marsupial teeth, for instance, we find the dentinal fibres everywhere continued into and distributed throughout the enamel. In the teeth of many fishes the enamel is penetrated by large canals containing organic matter. But these teeth rarely or never decay.

The case, therefore, stands thus: Human teeth, which contain little or no organic matter, often decay rapidly. The teeth of many animals and fishes, containing a large proportion of organic matter, rarely or never decay. To what conclusion are we forced in the face of these facts? Manifestly that the presence or non-presence of organic matter is an unimportant factor in the phenomena of decay of the teeth. The investigations of Drs. Miller and Black on this subject must be ranked as the most important ever made. I hope to supplement this work in a forthcoming series of papers on the results of microscopic investigation. The facts are all on one side of this question. The liability of human teeth to caries is largely due to environing conditions and not to inherent structure. The problem might with equal accuracy be stated in another form by saying that no tooth will decay if its environment be healthy, and no tooth can resist decay if its environment be unhealthy. By "unhealthy" I mean, of course, such particular external conditions as are inimical to the preservation of the tooth. Dr. Miller has shown what these conditions are. It would be going too far to assert that tooth-structure has *no* relation to caries, but even such a statement would be much nearer the truth than the position occupied to-day by a large majority of the dental profession. The

judicial mind which can rightly estimate the value of evidence by giving to each and every fact its proper place and importance is not a common possession, and it often takes a long time to turn men's minds from habitual ways of thinking, no matter how absurd the position occupied may be.

One further series of investigations is needed, and the results of this would, I think, give us all the necessary data for a thoroughly scientific formulation of the phenomena of decay of the teeth. Carefully conducted experiments should be made along the lines followed by Dr. Miller for the purpose of determining the relative rapidity of decay of teeth of so-called dense structure as compared with those generally regarded as less resistant to decay. When this work is accomplished we shall, I believe, find the difference far less than is popularly supposed.

It has been estimated that from five to seven years is required for a change in the molecular structure of bone. Dentine changes much more slowly, and nothing is more certainly established than the fact that there is *no* proper nutritive change in human enamel. How illogical, then, the contention that the rapid increase or decrease in decay of the teeth in any particular case is due to change of tooth-structure.

I am, dear sir, yours faithfully,

J. Leon Williams.

30 George Street, Hanover Square, London, W.

Current News.

WOMAN'S DENTAL ASSOCIATION.

The Woman's Dental Association held its regular meeting at the office of the president, Dr. Anna T. Focht, Broad Street and Columbia Avenue, January 4, 1896.

The essayist, Dr. Ellen Macmurray, of Chester, Pennsylvania, was not able to be present, so that time was given to incidents of office practice.

A demonstration of porcelain work was given by Dr. Focht.

Essayist on the list for February 1, Dr. Henry I. Dorr.

Emily W. Wyeth,
Recording Secretary.

3940 Fairmount Avenue.

THE

International Dental Journal.

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Original Communications.[1]

SUGGESTIONS ON THE USE OF ELECTRICAL OSMOSIS IN DENTAL PRACTICE.

BY PETER BROWN, L.D.S., MONTREAL, CANADA.

THE efficiency of this treatment in obtunding sensitive dentine has been so abundantly proved by other writers that any further argument in this article would be superfluous.

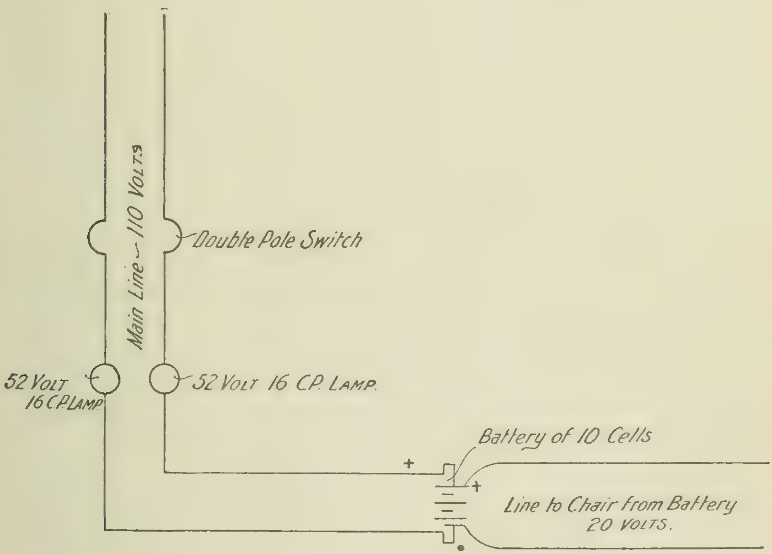
One of the principal things to be considered now is its method of application and the source of energy to be used. We have many sources of electricity, and in this article an effort will be made to suggest the best means of obtaining satisfactory results in cataphoric medication of sensitive dentine.

One source of power which is very much in use by dentists to-day is the ordinary one-hundred-and-ten-volt lightning circuit; this is a very satisfactory means of running a dental engine or a mallet, but it is far from satisfactory for the treatment under consideration. It is open to quite a few objections. Prominent among them is the unevenness of the voltage; for the delicate nature of the application in treating sensitive dentine a perfectly even pressure of current is absolutely necessary. This evenness is impossible to obtain on the ordinary light or power circuit, owing to the varying de-

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

mands made upon the generators from time to time during the day. A difference in potential of five per cent. may not be of much importance to the central station supplying the circuit, but it is of great importance to the patient who is being treated by it. From a large number of experiments made by the writer it has been proved that a difference in pressure of one-fifth of a volt is immediately felt by the patient, and very often it is painfully felt; this shows the necessity of a steady current. Another objection is that there is great danger from wires of a higher pressure falling across, or otherwise coming in contact with, the line supplying the dentist; this has happened more than once, and very often with unpleasant results. The fact of having a resistance in the circuit will not afford protection from accidents of this kind, as the sudden increase of pressure will overcome the resistance in use at the time, and force more current through than is required before additional resistance can be added. The danger of high-pressure circuits may be avoided by reducing the voltage with what is known as a rotary transformer. The type known as the motor-dynamo should not be used, as there is a danger here from leakage from the high-pressure side of the machine to the low-pressure, which is the one to be used in treatment; a one-hundred-and-ten-volt circuit may be reduced by connecting a one-hundred-and-ten-volt motor by means of a belt to a dynamo wound to give a current of twenty volts. The current from this could then be led to the chair, and used without the slightest fear of shock. This plan is, however, open to the objection of varying pressures, as when the voltage of the main line would drop there would be a drop in speed of the motor and a corresponding drop in the voltage of the dynamo. In the writer's experience, the most satisfactory and most reliable source of power for this work is the storage-battery. Where one can obtain the one-hundred-and-ten-volt circuit there is very little or no trouble in operating it; when it is received from the manufacturers it is charged, ready for use, and it may be connected with the one-hundred-and-ten-volt circuit with a sixteen candle-power lamp in series with it for resistance; as in sketch, a double pole-switch should be put in between the line and the lamp, and always opened when the battery is in use. Here we have a safe and reliable supply of energy always at our command, and always at an even pressure. The battery is kept charged by the lighting circuit, and requires but very little attention. A battery of ten cells should be employed, so as to have a potential of twenty volts; this is all the voltage necessary for this work, and is not

very often required. Ten volts will be found quite sufficient for the majority of cases, but is advisable to have an extra pressure in case of patients who have a very high resistance. Where the direct current is not available the battery can be charged at the nearest lighting station, and one charge should last a dentist for cataphoric treatment at least six months; where it is not desirable to go to the expense of buying a storage battery the ordinary Le Clanche cell of the type used for operating the telephone would answer the purpose very well, or the bichromate of soda cell makes a good battery, but they are more troublesome than the storage cell.



The next thing to consider is the means of reducing the current so that it can be tolerated by the tooth under treatment. This is accomplished by placing a rheostat in series with the battery and patient. The most compact and reliable form of resistance, in the writer's estimation, is one called the "Williams dry current-controller." This will give a resistance of one hundred thousand ohms on a ten-volt circuit, thus giving about the one tenth of a milliampère on the first contact. A milliampère meter is not necessary, but is very useful for purposes of record, and for assuring one that the current is on when the contacts are made. A voltmeter is also very useful for recording the pressure, but both of these instruments can be dispensed with. Where a galvanometer and voltmeter are used instruments recording in tenths or twentieths

should be employed. It is of great importance that the contact with the tooth should be firm, and not removed until the operation is completed, as any break in the circuit when the current is on is accompanied by quite a severe shock; before removing the contact from the tooth the current should be reduced by the rheostat to its zero point. A very good method of obtaining good contact with the tooth is to solder or otherwise attach to a rubber-dam clamp a piece of brass wire. To the end of this wire a piece of platinum should be soldered, as no metal but platinum should be used in contact with the tooth. In applying the clamp the tooth to which it is to be attached should be insulated by a piece of rubber dam. Take, for instance, a cavity in a central incisor, median approximal; after cutting away the walls sufficiently to gain free access to the cavity, the rubber dam being applied, the cavity should be wiped dry, and lightly swabbed out with a two-per-cent. solution of sulphuric acid. Before applying the acid the adjoining tooth and the edges of the cavity under treatment should be coated with a layer of sandarach or copal varnish; then apply to the cavity a pledget of cotton saturated with a forty-per-cent. solution of cocaine in water. A bicuspid clamp, with wire attached, is then fixed to the first bicuspid, and the end of the wire placed against the cotton. The wire should be bent so as to make a good firm contact with the cotton; of course, it is to be understood here that the clamp is outside the rubber dam and insulated from the tooth by the dam. The positive wire is then attached to the clamp, and the negative placed in the hand of the patient; the current is then turned on slowly until the patient gives evidence that it is being felt. It should be allowed to remain this way for about three minutes, when the current may be increased. In ten minutes the tooth should be insusceptible to pain, although the writer has had cases where forty minutes were necessary to obtund the dentine, but these cases are exceptional. In operating, where there are other fillings in the same tooth, and where these fillings are liable to be touched in preparing the cavity, a coating of varnish should be put on so as to insulate them.

Where it is desirable to remove the pulp, the following method may be used: Prepare the tooth and cavity as before mentioned, but cover the exposed pulp with sticking-plaster or other suitable substance; then place the cotton containing the cocaine in the cavity and apply the current as before. In ten minutes the current may be turned off, and the cotton removed, and the covering taken from the pulp.

Another application may be then placed in the cavity in direct contact with the pulp, and the current again applied. In ten or fifteen minutes the pulp can be removed without any pain, and the root immediately filled. In all these operations the cotton containing the solution should be moistened every four or five minutes, as when the water evaporates the current does not pass through, and time is wasted. A drop of water may be added with a small syringe or applied with a piece of cotton without removing the wire from the cavity.

Attention is directed to the following: Always make a fresh mixture of cocaine; have one grain of cocaine weighed out and divided into six parts. In using it moisten a piece of cotton sufficient to fill the cavity to be treated, and take with this the sixth of the grain of cocaine; have the cotton sufficiently moist to dissolve the salt and you will have good results. Cocaine solutions are not to be relied upon after they are two days old.

Where the skin on the hand is dry or hard and offers high resistance, a piece of cottonoid or lintine should be wet with a solution of common salt and wrapped around the handle in the patient's hand. Or, the negative electrode may be applied to the face or neck, but this is not desirable, as it leaves quite a red spot where the contact was made, owing to the increased circulation at this part.

Care should be taken not to allow the positive wire to touch the skin or the mucous membrane at any point, as, if a connection is made at any other point besides the tooth under treatment, the positive current will enter at this place of contact and lessen the amount of current going through the tooth. In using this treatment without applying the rubber dam, the fingers should not come in contact with the mucous membrane unless the positive electrode has a well-insulated handle.

The following cases may be of interest:

Mr. B., aged twenty, highly nervous, presented a first left superior bicuspid anterior approximal cavity; history of toothache for two days; on examination, pulp was found exposed; the dam was applied and cavity wiped dry. At this time the tooth was giving severe pain. A pledget of cotton saturated with the cocaine solution was applied, and the current turned on. In less than one minute the pain had ceased; the current was allowed to pass through for fifteen minutes. At the end of this time the application was removed and the pulp was found completely anæsthetized; it was removed with broach and drill, and the cavity immediately filled.

Mr. H., aged eighteen, approximal cavity in central incisor exceedingly sensitive; could not bear the slightest touch of excavator or bur. At this time the writer was using a water rheostat and the current was derived from a ten-volt dynamo; by reducing the speed a current of five volts was attainable. This was the voltage of the current first used on this case. With the rheostat set at its highest resistance the patient could not stand the current, giving marked evidence of pain on the first contact. Later, a dry current controller was procured, and the current taken from a storage battery of ten cells. This battery was provided with a cell-selector or switch-board by which the voltage could be varied from two to twenty volts. The same case was then treated; the current had to be first reduced to the pressure from one cell or two volts; then again reduced by the rheostat. This current was easily tolerated by the patient, and was increased, after ten minutes' application, to ten volts. It was found necessary to treat this tooth for thirty minutes before the dentine was anæsthized. Six cavities were filled for this patient, and each one of them required the same treatment.

Miss G., cavity in second superior molar anterior approximal; pulp exposed; history of toothache for three or four days. The dam was applied, and the cocaine applied as before, only in this case the exposure was protected by a coating of copal varnish. After about eight minutes' application of the current the cotton was removed, and the application placed in direct contact with the pulp. The current was again applied, and allowed to remain on for twenty minutes. At the end of this time the pulp was found completely insensible to pain, and was removed without any pain or trouble.

Mrs. L., two approximate cavities in central incisor and right lateral approximal to each other; after applying the dam the walls of cavities were slightly cut away so as to allow free access to them, and the space between them filled with cotton saturated with the cocaine solution. A clamp was attached to the first bicuspid, and the wire, which was attached to this clamp, pressed into the cotton. The current was then turned for ten minutes and both cavities were anæsthetized at the same time. The cavities were both filled at this sitting and were found to be insensible to the pain which very often accompanies the operation of finishing gold fillings with strips or disks. Advantage should be taken of this, and cavities always filled at the same sitting as when prepared, especially for gold fillings.

Fig. 1.

Fig. 2.

Miss M., cavities in both superior left bicuspids; after the dam was applied to these teeth only, a clamp was put on the first molar. To this clamp was soldered a wire having two branches from its end; these were tipped with platinum. After cutting away the edges of the cavities and placing the cocaine in them, the two ends of the wire were arranged so as to have a tip in each cavity. By this means both teeth were treated at once, and much time saved.

14 Phillip's Square.

PYORRHŒA ALVEOLARIS.[1]

BY EUGENE S. TALBOT.[2]

Much literature of the present disease is chiefly given to its name, with the intent of fixing the views of the particular name-deviser on dental science.

The old up-hill scientific blunder of replacing names with meaning fixed by usage by others better coined from a linguist's standpoint leads only to the accumulation of names.

Riggs's disease is a title too firmly fixed to be dislodged by terms limiting the pathology of the disease, but expressive merely of temporary phases of dental thought.

Theories as to the etiology, pathology, and treatment of Riggs's disease are too numerous, discordant, and fleeting to merit lengthy discussion except as they seemingly express dominant thought. The latest theory advanced is the influence of the dyscrasic or constitutional abnormal states so much discussed in medicine, which has found expression in dental pathology in the uric-acid or gouty theory advanced by Dr. Reeves, and amplified by Dr. Peirce,[3] of Philadelphia. This has found support by able practitioners.

Clinical tests alone should be applied to all theories. Applying these to the uric-acid or gouty theory, I found that in but few cases of the uric-acid diathesis could any evidence suggesting pyorrhœa be detected.

According to Peirce, when uric-acid salts attain a certain percentage they are eliminated from the blood through the walls of the capillary vessels, passing out associated with lymph. The tissues become the seat of this salt exudate, and permeate

[1] Read before the Academy of Stomatology, January 28, 1896.

[2] Fellow of the Chicago Academy of Medicine.

[3] International Dental Journal, vol. xv. pp. 1, 217, 501.

the connective tissue, this tissue presenting the greatest density and least degree of vascularity. To test the validity of this claim of Dr. Peirce I had instituted two independent series of examinations: one at the Columbus Medical Laboratory, where special cases were examined; the other at the laboratory of the Northwestern University Woman's Medical School, to which teeth were sent as they were removed from the mouth. One hundred examinations were made in one, and one hundred and fifteen in the other. Teeth were obtained from three institutions in Chicago which make a speciality of extraction. I was careful in selecting only diseased teeth with calcic deposits. Of the one hundred examinations made in the Columbus Medical Laboratory fifty were specimens of calcic deposits from my patients; fifty were obtained at the institutions just mentioned, and therefore have no history.

The one hundred examinations at the laboratory of the Northwestern University Woman's Medical School have no history, except that they were good cases of pyorrhœa, with plenty of calcic deposits, loose in the sockets when extracted.

The three tests recommended by Dr. Peirce were used in both laboratories,—

1. The hydrochloric acid test.
2. The dry distillation test.
3. The murexid test.

Of the one hundred and fifteen examinations made at the Northwestern University Woman's Medical School by the first test, in only two cases was found the needle-shaped crystals, and one in which there was a slight resemblance of uric-acid crystals.

By the dry distillation test, thirteen gave no reaction from ammonia, and in seven the reaction was slight. The remaining eighty gave a decided reaction.

By the murexid test, four gave a slight murexid color, but the remainder gave no reaction.

Special examination was made of twelve of these teeth by the addition of strong hydrochloric acid, warming, decanting the acid, and washing with water. These gave no reaction by the dry distillation tests for ammonia. Two gave a slight reaction by the murexid test.

In examination of three uric-acid diathetic women, over forty years of age, uric acid was not detectable either by the murexid test or microscopically.

The examinations made in the Columbus Medical Laboratory are still more interesting, since among them are specimens from

patients whose history could be obtained, and the results easily noticed.

Of the fifty obtained outside, eight gave positive results from all three tests. The other forty-two were positive by dry distillation, and negative by the murexid and microscopical tests. Of the fifty patients, thirty-eight females and twelve males, thirty-two are over forty years of age, twelve over thirty years, and six over fifteen years.

Twenty-six have uric acid to a greater or less extent.

Nine suffer with indigestion, seven of which are subject to sick headache.

Thirty-four have rheumatism.

Six are English, and four of these have the true English gout; the other two have rheumatism. All are positive with the dry distillation test. All are negative with the murexid test. Forty-nine are negative with the microscopical test. One shows needle-shaped crystals, but not uric acid. It is a singular fact that the cases examined in both laboratories, and in which there was uric acid and gouty histories, gave negative results.

Examination of calcic deposits by the dry distillation test shows that out of two hundred and fifteen cases, all, with the exception of the twelve cases which have been treated to remove all of the nitrogenous material, responded. The twelve cases so treated did not respond, since all nitrogenous compounds in and about teeth (even the saliva), when burned to an ash, will produce ammonia. This test is of no value. By the murexid test only twelve out of the two hundred and fifteen gave a positive reaction. By the microscopic examination only ten showed crystals. One of the chemists who made the examination is positive that they are uric acid crystals; the other is not, since lime-phosphate crystals resemble them too minutely to be with difficulty distinguished. Admitting that all of those cases reported be uric acid, it is barely possible that it might come from the blood direct, since blood-stains are almost always found upon the deposit, either from extraction or in removing it from the teeth in the mouth. Even if all the cases reported from both laboratories be uric acid deposits, this is a small percentage (about five per cent.) of cases in so large a number, and far from supporting the broad claim that the uric acid is the chief cause. The uric acid deposits are probably nothing more than an expression of the condition of the blood, and not the cause of the disease.

If this theory, moreover, were correct, the deposits, which are

in the capillaries in a liquid state, surrounding the teeth, would attack all the teeth at the same time, and deposit equally or nearly so around the root of each tooth, which never occurs.

Certainly uric acid cannot produce that peculiar form of pyorrhœa in which no deposits are found, and which is so frequently observed. Again, there are many who suffer from uric acid poisoning for years, yet do not have tartar or serumal deposits. I have had uric acid poisoning for ten years, but have an exceptionally healthy mouth.

The uric acid poison theory does not account for those large, dense deposits frequently observed around the margins of cavities, protruding fillings, or points of irritation, and in no other locality in the tooth. The uric acid or gouty diathesis theory is not in harmony, moreover, with clinical observation, as I shall show later on.

Since pyorrhœa is so prevalent among our patients, and since so few suffer with uric acid poisoning, causes other than a gouty diathesis must be looked for.

Below are the official reports.

LABORATORY OF THE NORTHWESTERN UNIVERSITY.
WOMAN'S MEDICAL SCHOOL.

JEROME H. SALISBURY, A.M., M.D.,
Professor of Chemistry.

CHICAGO, December 14, 1895.

DR. EUGENE S. TALBOT:

DEAR DOCTOR,—I have examined the calcic deposit from one hundred teeth by the three tests which you suggested,—viz., dry distillation, the murexid test, and microscopic examination of the residue after evaporation with hydrochloric acid.

By the dry distillation test thirteen gave no reaction for ammonia, and in seven the reaction was slight. The remaining eighty gave a decided reaction.

By the murexid test four gave a slight murexid color, but the remainder gave no reaction.

Under the microscope I saw in two cases needle-shaped crystals, and in one some crystals which somewhat resembled the crystals of free uric acid. In the other specimens I found no indication of uric acid.

I have examined twelve other teeth by the same tests, except that I preceded the dry distillation by the addition of strong hydrochloric acid, warming, decanting the acid, and washing with water. These gave by dry distillation no reaction for ammonia. By the murexid test two gave a slight reaction.

The specimens of calcic deposits from the cases of Mrs. T., Mrs. C., and Mrs. H., gave no indication of uric acid by either the murexid reaction or microscopic examination.

As a test for uric acid the method of dry distillation, and testing the gases evolved for ammonia, is in my opinion entirely inconclusive. The reaction will of course be given by most nitrogenous organic matters, and some of these will always be present in the material taken from the teeth.

The murexid test is not entirely conclusive, as there are a few other substances that give a similar reaction, but they are not very likely to be present in the calcic deposit on the teeth. The murexid reaction obtained in the tests which I made may have been given by the dried blood, as blood sometimes contains enough uric acid to give a decided reaction.

The discovery of needle-shaped crystals by the microscope cannot be regarded as positive evidence of the presence of calcium urate, because calcium phosphate crystallizes in crystals of similar shape.

Yours very respectfully,
(Signed) J. H. Salisbury,
Professor of Chemistry,
Northwestern University, Woman's Medical School.

Columbus Medical Laboratory,
Columbus Memorial Building, Suite 1403,
103 State Street. Tel. Main, 3866.

A. Gehrmann, M.D., Bacteriologist.
John A. Wesener, Ph.C.H.D., Chemist.
W. Evans, M.D., Pathologist.
Wm. M. Harsha, M.D., Secretary.

Chicago, December 20, 1895.

Dr. E. S. Talbot, No. 1205, 103 State Street, Chicago:

Dear Doctor,—I beg leave to report as follows on the specimens of incrustations from one hundred teeth and calcic deposits sent the laboratory. The tests employed were,—

No. 1, dry distillate.

No. 2, murexid.

No. 3, crystals.

Each of these tests was employed in each of these cases. One hundred responded to test No. 1. Eight responded to tests Nos. 2 and 3.

Test No. 1 gives a reaction with any organic compounds giving ammonia as a decomposition product. Saliva ash gives the reaction.

The conclusion to be drawn, then, is that eight specimens of this one hundred contained uric acid and urates.

Very truly,
Dr. J. A. Wesener,
Chemist to Columbus Medical Laboratory.

Ten years ago[1] I published some observations on pyorrhœa, which it was hoped some one proficient in microscopy would take up, and pursue the investigations to the end. I have never observed any allusion to it. Among the points then made was that pyorrhœa was on the increase; that a large majority of patients suffered more or less from it, and that modern dentistry had most to do with the cause.

I still hold these opinions, since clinical experience in the different asylums of this country and Europe, as well as close observa-

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[1] Dental Cosmos, 1886, vol. xxvi. p. 689.

tion of my office patients, has given me a broad range to study the etiology of this disease.

Dr. E. Magitot in 1867 published the most complete paper upon this subject, describing the disease in its progress to the end, but says that the gum, being in all cases attacked subsequently only, is not the real seat of the lesion. The disease with which we are occupied, he says, "seems essentially characterized, from an anatomical point of view, by a slow and progressive destruction of the periosteal membrane,—a destruction of an inflammatory character, of chronic progress, proceeding from the neck to the end of the root, and leading without fail to the loss of the tooth. This special feature, its mode of origin, and the precise seat of the lesions seem to justify the name alveolo-dental periostitis. But, notwithstanding its primary origin in the periosteum, and its complications with the gum and bony alveolar wall itself, the study of the successive morbid phenomena does not allow us to admit, as various authors have claimed, that these parts are originally the seat of the disease. I believe Dr. Peirce takes the same view. I take just the opposite,—

1. That the gum is the first tissue attacked, and,
2. That these parts are originally the seat of the disease.

When a tooth has been extracted that has been associated with pyorrhœa, clinical observation shows that the margin of the peridental membrane has changed its locality. Instead of being in its normal position at the neck of the tooth, it has receded in a more or less irregular line towards the apex of the root. The extent of this recession depends upon the duration and power of resistance of the disease.

The membrane, instead of being thin and of a pink color, is quite thick and of a deep red. The inflamed membrane may extend through the entire length of the root, or in circumscribed localities. The space upon the root made vacant by the destruction and loss of the peridental membrane may be quite clear and smooth, or it may possess calcic deposits. These deposits may consist of a uniform ring extending around the entire tooth, or circumscribed masses of deposits may be located at different points about the root. As the membrane recedes, the deposits follow after it upon the root or roots.

Between the border of the calcic deposits and the peridental membrane is a space one to two lines in width, where the root or roots of the tooth is perfectly smooth; this is the pus-line of clear, smooth tooth-structure, and is nearly always situated between cal-

cic deposits and the peridental membrane, showing that the calcic deposits are not always found in the membrane as Dr. Peirce claims. 2. The space upon the root of the tooth between the peridental membrane and the neck of the tooth, including the calcic deposits, is bathed in pus. This disease is an inflammation of the gums, and is due to irritation from çonstitutional and local causes.

Constitutional causes are tartar, from mercurial salivation, potassium iodide, and other drugs, syphilis, loss of vitality, locomotor ataxia, paretic dementia, and the menstrual nisus. In neurotic and degenerate classes, as a whole, pyorrhœa exists to a greater extent than in the more healthy classes. In any and all of those diseases in which systemic disturbances produce trophic changes this disease is present.

LOCAL CAUSES.

As has already been said, modern dentistry is producing more pyorrhœa than any other one cause. Some cases result from infection, from micro-organism, application of the rubber-dam, clamps, wedging the teeth, correcting irregularities, sharp edges of decayed or filled teeth, protruded fillings, spaces between teeth, crown- and bridge-work, over-stimulation in the use of the toothpick, artificial teeth, more particularly ill-fitting plates, injuries, tartar-accumulation and decomposition of food and collections around the necks of teeth, tobacco, and everything of a foreign nature, as observed in the mouths of idiots, imbeciles, epileptics, and all individuals who do not take care of the teeth. The result of irritation from constitutional and local causes is inflammation.

Light is thrown upon this subject by a careful study of the anatomy and physiology of the parts involved. We have the root or roots of a tooth on the one hand and the bony structure of the alveolar process on the other, and between the two resisting walls we have the peridental membrane, composed of fibrous elastic connective tissue, which give nourishment to both the tooth and the alveolar process. The alveolar process is a transient bony structure, simply for the purpose of holding the teeth in place after they have erupted. The gums or mucous membrane which covers the alveolar process, and which is united with the mucous membrane throughout the mouth, connects with the peridental membrane at the margin of the process. That the lymphatic system is richly developed at this locality is demonstrated by the fact that when the temporary and permanent teeth are lost the alveolar process absorbs. No structure of the body is similarly situated as the

peridental membrane. The structure of the tooth, not changing its form or size, sends very little nourishment into the cementum.

The peridental membrane obtains its blood-supply from the arteries at the apex of each root, just before they enter the foramen and through the alveolar process, but the largest amount passes through the gingival border of the gum.

According to Black[1] these capillaries run longitudinally from either end of the root towards the centre, giving off branches which enter the alveolar process, but not the cementum, because of the peculiar locality of the membrane. May not the anatomical position and a physiological action on this membrane have something to do with the disease?

The gums are rarely found in a healthy condition. They may become inflamed from either constitutional or local causes mentioned above. If the cause is removed early and antiseptic and astringent washes used, together with the stimulating effect of the tooth-brush, the gums will return to a healthy condition. The peridental membrane is never invaded by pus-germs so long as it is in a perfectly normal state. If, on the other hand, inflammation of the gums, due to either constitutional or local causes, persists, it will extend to the capillaries of the peridental membrane, causing inflammation and stasis of blood in that direction.

The peridental membrane has not lost all of its source of nourishment, although the greater part is cut off; its vitality is thus impaired.

When inflammation of the peridental membrane takes place, a proliferation of small round cells produce a new connective tissue. This tissue causes inflammation and thickening of the peridental membrane, which is subject to necrosis, first, from its position between the two bony walls, causing pressure; and secondly, from deficient blood-supply.

Atheromatous patches, composed of granular *débris* and fatty detritus, in which are deposited lime-salts liberated from the tissue-cells and from the blood or lymph, are then formed. These patches soon become infected with pus-germs, or infection of the tissue in the primary stage of the inflammation may take place.

These pus-germs, according to Miller, are found in every mouth, but more especially around the necks of the teeth. Infection means degeneration and liquefaction, not only of the immediate tissue,

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[1] American System of Dentistry.

but also of the more healthy peridental membrane, but in a less marked degree.

Pus-infection-producing pockets are formed first by circumscribed inflammation at a particular point of the gum or peridental membrane at the neck of the tooth. The inflammatory process extends into the peridental membrane along a blood-vessel or lymph-stream. This may extend part of or the entire length of the root of the tooth, the tissue-degeneration taking place in precisely the same manner as before, only in a circumscribed way. In phthisical patients, and those with low vitality, and patients who have been ill for any length of time, a low form of inflammation of the gums extending to the peridental membrane with pus-infection takes place, and degeneration of tissue ensues, with or without granular patches and calcic deposits.

The granular *débris* or calcic deposits in all cases are a secondary consideration in this breaking down of tissue, the inflammatory exudate and pus-formation being primary.

Sometimes the degeneration of tissue will extend the entire length of the root. The atheromatous patch of degeneration is always located in that part of tissue farthest from the blood-supply or at the point of least vitality, hence the reason of the breaking down of membrane and deposit upon the root of the tooth.

A pathological condition of the jaw, familiar to all dentists, which must here be described, although seemingly foreign to the subject, is due to the immediate cause of pyorrhœa. Its etiology has never been explained. I refer to that condition of the jaw when the pulp is dead in the tooth and a large or small area of the bone about the root has absorbed; frequently the bone is entirely lost about the root and the cavity covered over by the external mucous membrane. Upon opening this cavity the root or roots are exposed to a greater or less extent, depending entirely upon the size of the cavity.

When death of the pulp takes place, with or without alveolar abscess, inflammation of the peridental membrane may take place at the apex of the root or roots. We now have the same process as before the pus-infection and degeneration of tissue, the pus-germs infecting the peridental membrane through the pulp-canal. Absorption and liquefaction of the alveolar process takes place after the death of the peridental membrane (not due to pressure of an alveolar abscess, but from pus and natural absorption due to the destruction of the peridental membrane), and the root is frequently partly or wholly covered with calcic deposits.

Lime-salts are chemically non-irritating, as cementum is properly formed from the peridental membrane, and as exostoses are found on the roots of teeth without having caused any symptoms, calcic salts deposited here are physiologically inert as any foreign material can be in the body. This is to be expected since lime-salts in the blood is nature's great weapon with which to ward off and heal disease and not to disorganize tissue.

That many forms of micro-organisms are present in the mouth, producing the original inflammation of the gums, there can be no doubt, since the cultures are there with favorable surroundings. They assist in producing the inflammatory process for the following reason: treat a mouth with one, two, or three loose teeth, heal the tissues, and allow the loose teeth to remain. Stop the treatment, except the free use of the brush, and in the course of a few weeks the inflammation can be seen starting from the loose teeth and extending from one tooth to another until all have become infected. Remove the tooth or teeth, and when the gums are in a healthy condition they will remain so by the same line of treatment. I have observed this many times.

The neurotics and degenerates, whether wealthy people or confined in State institutions, are mostly afflicted.

The age at which this disease begins favors those over forty years, but it is found in children. I have observed it in my little patients before having their teeth regulated. This is due, first, to trophic changes, and, secondly, to inflammation of the gums due to want of hygienic measures. I have also observed it in the mouths of asylum children, due to the same cause. Miller mentions "many rachitic children, from four to six years, who had but a few teeth left, and, also, "out of twenty-six cases under twelve years, in which seven manifested pronounced symptoms of pyorrhœa," the class of food given asylum patients of all ages, together with a want of cleanliness, produces the inflammation of the gums, following with pyorrhœal symptoms. A change in the management recently in a public institution near Chicago, and the appointment of an economical superintendent, caused the inmates to come down with scurvy, from the result of which a large number of cases of pyorrhœa developed. Patients suffering with locomotor ataxia and paretic dementia are very prone to this disease. This is true to trophic changes. In forty-four locomotor ataxics, all had the disease in a more or less marked degree. Of three hundred and sixty-five paretic dements, fully two-thirds had pyorrhœa.

A marked illustration of pyorrhœa due to trophic changes and

want of hygienic measures is found in the mouths of pregnant women, and a most marked illustration due to the same cause is in domestic animals or wild ones in captivity.

Some authors have tried to associate pyorrhœa with catarrh and nasal lesions, such as polypi, adenoid vegetation, and hypertrophy of the mucous membrane, turbinates, and stenosis of the nasal cavity, as well as tonsillitis and all forms of sore throat. In a general way these lesions are found among the degenerate classes, and while one is not dependent upon the other, they are frequently associated, often patients suffering with pyorrhœa who claim to have been salivated. It can now be seen how such conditions can be brought about.

The period of life between forty and sixty years is to man a period of involution, when certain functions are ceasing to be active factors in the light of the individual. The structures devoted to retrograde metamorphosis assume predominance, and the arterial system shows a tendency to fatty changes. In both sexes, at this period, as at puberty, there is a marked tendency to nervous diseases. The changes of what well may be called the climacteric are the results of deficient power to supply nutrition rather than excess in utilization. Hence the primary change of the arteries and their secondary consequence in the peridental membrane. The gums become inflamed, and there is no desire to keep the mouth in a hygienic condition, hence pyorrhœa is more frequent in advancing years.

As the peridental membrane recedes the teeth loosen. The irritation in mastication assists in maintaining the inflammation, and the destruction of the membrane is hastened until the tooth becomes a foreign body and is exfoliated.

The alveolar process, as has been shown, is a transitory structure, simply for the purpose of holding the teeth in place; when they are removed the process absorbs. It is reasonable to suppose that when the peridental membrane is destroyed the process has lost its function and naturally absorbs away. This is hastened by the accumulation of pus in and about the process.

In a general way pyorrhœa, like all diseases of the body, is influenced to mildness or severity according to health and tonicity.

TREATMENT.

No one in the profession is more disappointed as to the views as to what shall constitute the line of treatment than the writer, since he has always advocated that pyorrhœa was a constitutional dis-

ease and required similar treatment. Investigation has shown that inflamed gums are due to constitutional and local causes. It is another illustration of the fact, however, that to know the cause is to find a remedy. It does not necessarily follow that the cure is an easy one to accomplish, since the location of the disease is nearly always difficult to reach. Especially is this so in the later stages. The line of treatment in the early stages is clear. It must be purely of a prophylactic nature.

No matter of what nature the patient may be; a monkey in the zoological gardens, a pet lap-dog, wild animals in captivity, rachitic and idiotic children in public institutions, or a degenerate in one of our best families, living in luxury without fresh air and outdoor exercise, and upon food entirely at variance with what they require, must necessarily have soft spongy gums. If the food be changed in animals, with a vigorous use of the tooth-brush, together with antiseptic and astringent washes, with plenty of exercise by our patients, the gums will remain in a healthy condition, the peridental membrane will not become involved, and pus-germs will not invade the tissue. In other words, healthy gums will invariably prevent the disease.

If inflammation has extended to the peridental membrane, and pus-infection has taken place, with or without calcic deposits, instruments should not be used so as to come in contact with the edge of the membrane. The membrane should not be injured under any circumstances. The slightest injury increases the area of the infection. Since inflammation and pus-infection are the primary stages of the disease, and the calcic deposits always secondary and a result, and since nature tolerates lime deposits in all parts of the body, it would seem immaterial whether the deposits are removed from the root or not, provided the application extended beyond the deposits and reached all parts of the diseased membrane. I know of no instance in medicine or surgery where the calcic deposits in any other part of the body are taken into consideration in the treatment of disease. Nature takes care of such deposits. Such being the case, there is no reason why nature will not tolerate calcic deposits on the root of a tooth. I do not, at this time, make the positive assertion that it is unnecessary to remove the deposits, since I have not had sufficient experience to warrant this statement, but simply offer it as a suggestion. From our past experience in the treatment of the disease, the deposits must be removed; and right here I would suggest that in the future treatment of this disease a dissolving fluid that is not injurious to the surrounding

tissue should take the place of instruments, especially when the disease is extensive.

What is necessary, whether we remove all the deposit or not, is to use an antiseptic disinfectant and germicide in such quantities that all parts of the tissue, including the deposit from the gingival margin of the gum to the edge of the peridental membrane, shall become perfectly immune. If this can be carried beyond the calcic deposits so as to reach the edge of the membrane and restore it to a healthy condition, we have accomplished all that is necessary, since the cause of the deposit will be removed.

It is readily understood how, if the disease is allowed to progress, the farther the edge of the membrane is from the gum-margin the more difficult it is to get the drug to the edge of the membrane, hence the necessity of early treatment. The farther the disease extends, the less the blood-supply to the membrane and the less show for recuperation. I cannot recommend any particular antiseptic, disinfectant, or germicide in the successful treatment of this disease. I have had marked success by saturating the gum thoroughly inside and out with officinal tincture of iodine every other day.

The following illustrations imperfectly show the changes which take place in the peridental membrane.

Figs. 1. and 2. show the root of a cuspid tooth: *A*, the dentine; *B*, the cementum; *C*, the peridental membrane.

The peridental membrane in Fig. 1. shows the first stages of inflammation, the infiltration of the round cells, and thickening. Fig. 2. shows the thickened peridental membrane, and the atheromatous degeneration marked *D*.

ORAL ELECTRICITY AND VITAL CURRENTS.

BY S. B. PALMER, M.D.S., SYRACUSE, N. Y.

The January issue of the *Dental Cosmos* for 1896 and the *Dental Practitioner and Advertiser* for the same month contain a paper by the writer entitled "Dental Science Then and Now." This paper was written in answer to a challenge by the editor of the *Dental Practitioner*, as the following quotations from his editorial will show: "In this instance, we did desire to challenge an answer on the part of Dr. Palmer, and we are very glad that the attempt was

successful, and that he was roused to the effort which the sound of the bugle provoked. Nothing but good can come of it, provided no feeling of personality enters into the discussion." Knowing, as we do, that Dr. Barrett does not allow discussion to break the bonds of friendship, we have only to look forward to the promised good. The epitome is a fair review of the paper, and an acknowledgment that it has made a considerable impress upon his mind. "But there are other points on which we can but doubt." Dr. Barrett has entered into this discussion for the benefit of the profession, and no doubt voices the sentiment of many other representative teachers and writers; therefore we use the points at variance as texts from which to elucidate our understanding. To save quotations we refer the reader to the paper above mentioned, which will give the substance in detail.

The paper contains answers to some of Dr. Black's conclusions, published in the *Dental Cosmos*, May, 1895, under the head of "The Physical Characteristics of the Teeth." In the discussion we classified teeth, defining them as physical and vital. By physical we mean any and all that had been extracted, those with devitalized pulps, including those fully matured, and all that have done receiving support from the pulp. Second or vital, immature, or teeth of children, and highly organized or sensitive teeth at any age. The first division have been so ably defined by Dr. Black that we need only to refer the reader to his article. The second class, we claim, are vital organs of the body, which receive nourishment and support from the pulp, which acts as an organ to mature a tooth, as other organs do to nourish and support other parts of the system. This view of the matter accounts for the systemic changes in the teeth due to ill-health, long sea-voyages, change of climate, effects of drugs, etc.

It includes constitutional differences not discernible under analysis or visible by the microscope. Let it be understood that we are now discussing matters upon the vital plane in the animal kingdom. Because we do not know just what life is we should not despair of searching for the laws which govern those conditions. This has been the study of the writer for years, and we now lay before the reader a few practical suggestions as the outcome of investigation.

This brings us to a full understanding of the hinderances in the way of receiving benefits from our teachings. Our opponents are still searching for light of the living among the dead. I quote the following: "Demonstrated facts cannot be successfully refuted by

mere generalizations. They must be met by counter-facts as incontestably demonstrated by equally conclusive experiments. Physical proofs cannot be overthrown by abstruse metaphysical reasoning, and the world is waiting for some one to present a series of established tables that shall confute those of Dr. Black. He has made assertions, and apparently proved them, that are at variance with all our preconceived ideas. If he is right, we must look elsewhere than in the degree of calcification for the liability of teeth to decay."

The above shows plainly that the table and figures are based upon the physical plane. In all the discussions upon this subject investigators have failed to recognize the continuity of loss from elements to animals. We read in the history of creation, "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life: and man became a living soul." This brief statement doubtless includes vastly more time than many suppose. Chemistry verifies the record. Where the simple elements of matter *are* there is the breath of life (chemical affinity) also. It touches atoms, and chemical compounds appear. Another breath,—lichens, grass, flowers, fruits, and trees abound. Again, this organized matter receives vivifying force from above, and man has had breathed into him the breath of life, and in him is incarnated all the uplifting forces and vital evolutions that preceded him.

And at this point I desire the reader to understand the cause of opposition. First, there is no recognized authority for the doctrines we set forth. Second, their adoption would call for a complete revision of text-books on physiology. Medicine would be more deeply interested than dentistry. As before mentioned, all matter upon the animal plane has been organized mainly by the agency of vegetable life, in which vital electrical currents performed a part, by which is meant the to-and-fro electrolytic currents which transmit the influence of solar heat and light from foliage to roots and return. This conductor is the sap, which holds in solution the elements required to build up and nourish every portion of the vegetable. The same principle appears in the higher animals. The blood contains the elements, and the various organs perform the office of distribution. In all immature teeth we see the principle mentioned in the growth of trees. The tubes in dentine are filled with the fluid containing the elements necessary to mature the organ. This fluid is in connection with the pulp, which furnishes the supply. It is not intended by nature that this current should

be exposed to the action of external agents any more than that the brain should be affected by fractures of the skull. Those who oppose the electro-vital theory contend that gold does not constitute an element of a battery in a tooth unless it is adjacent to other metallic fillings. This would be true from a physical stand-point, when we consider that vital organic matter makes up the other elements of the battery, also that a negative plate of metal bears the same relations to nature's vital current that minerals do when taken into the stomach as food. The effect of metal upon immature dentine is to stay the process of calcification by thermal changes, which in organized currents combine thermal changes. Heat or warmth is life, the other extreme is death. Thus it is that dentine containing a large proportion of organic matter becomes a conductor of currents or temperature; the natural current being reversed, the dentine in contact with fillings is not matured, and caries is the effect.

With this understanding, we can see that by closing the dentinal tubes with some insoluble lining, thereby protecting the fluid in the dentine, the process of calcification will continue. We rarely find dentine sufficiently dense to resist external currents before the age of fourteen or fifteen years. As we approach the age when the teeth are matured the tables and figures given by Dr. Black apply as claimed.

The object of this writing is to draw a distinct line between teeth that are receiving support from the pulp and those deprived of such nourishment, either by devitalization or having received the required proportion of lime-salts to render dentine a non-conductor; in either case vitality has little to do in changing the physical condition of the dentine. We do not intend to controvert opposition. If the world is not yet ready to receive the doctrines herein set forth, we must await further investigation. The request that a like series of established tables shall be presented that shall confute those of Dr. Black. This is most unreasonable and unscientific, to insist that vital organic compounds shall be tried by physical laws. Who would believe that a like investigation of the skeletons of a robin and an English sparrow would or could determine which bird would endure the lowest temperature? Yet the world knows from observation. And so does the dental world know that teeth of children need filling-materials best adapted to their conditions. The laws of life no more fit matter upon the physical plane than Saul's splendid armor fitted David for the battle in which he was about to engage. All understand that mind

influences matter. What is the connection? A locomotive stands upon the track, fired up and ready to start. The engineer has a mind to make it go. The order emanating from the brain is transmitted down to the throttle-valve through the various planes to come in touch with inert matter that matter had to pass through in evolution to come in touch with mind. Mind despatches an organized current to the muscles of the arm, the valve is opened, the engine obeys. Involuntary action of organs act upon the body, in respiration, heart action, assimilation, etc., according to the conditions, producing normal or abnormal effects. In this manner the dental organs conform to systemic influences.

The question of etiology of dental caries cannot be settled upon the physical plane. Carefully-conducted experiments on that line furnish tables, figures, and conclusions which teach that, "with our present knowledge, the only basis for selection and adaptation of filling-materials to classes of cases is the individual operator's judgment as to which he can so manipulate as to make most perfect filling, considering circumstances, his own skill, and durability of materials." Opposite we have the recorded testimony of clinical teaching that gold alone is not the best material (even in the most skilful hand) to use in filling the teeth of young patients, and practice seems to recognize this as a fact; and here the dental world seems to be waiting for tables and figures, which cannot be produced upon the animal plane. Let us return to the foot of the scale, take the simple elments, and with the evolution run to the top, and return, observing the principles of the first law and its conformity to each stage of the evolutions of matter. First, we have matter and chemical affinity which unites elements, and chemical compounds are the result. Second, minerals are organized, vegetation springs up, and in connection and direction organized currents take the place of the electrical current on the mineral plane. Third, organic matter combines, and animal life appears, with the organic current, now vitalized, preserving its involuntary functions, which in the vegetable kingdom brought forth flowers, fruits, trees, each after its kind, in animal bodies through the organs perform the same office, and still higher the vital current comes in touch with the soul and the Creator. Thus man thinks, wills, and through his organization acts as truly in conformity to the organized current as the telegraph-sounder acts under the the physical current. With this key to knowledge, many of the perplexed questions regarding physiology would appear simple.

Reports of Society Meetings.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 169.)

August 8, 1895.—Third Day.—Evening Session.

The meeting was called to order by the vice-president, and the minutes of the previous session read and approved.

Section V. moved that the following resolution be adopted :

Resolved, That the American Dental Association condemns the use of secret preparations known as local anæsthetics ; that the members thereof pledge themselves to abstain from the use of such nostrums, and all other secret remedies.

Dr. Marshall moved an amendment to include all secret nostrums in which the formula is not printed at the bottom.

Dr. Flagg moved to further amend by leaving out the word "pledge" and to have it merely a resolution of condemnation.

The amendment was accepted by Dr. Marshall.

A report was read by the secretary as to the financial condition of the Dental Protective Association. The committee, consisting of Drs. Smith, Shepard, Noble, and Morgan, find that all funds collected have been accounted for, and all disbursements have been made in the direction of the objects of the Association, and that funds on hand have been securely invested.

The report was adopted.

Dr. Crouse.—When we arranged the programme the request was made that one evening should be set apart for the display of stereöpticon views, and we arranged for this evening. Since then we find that a paper is to be read to-night ; it has been consented to allow the paper to be read, on condition that the discussion would not follow this evening.

Dr. Gillette, of Newport, then read a paper entitled "Cataphoresis for obtunding Sensitive Dentine." He stated that when he read a paper last week before the New Jersey State meeting some gentlemen understood him to claim cataphoresis as a new idea. Dr. Peterson's paper, which he referred to, will give the whole

history of cataphoresis, going back to the first experiments in 1858 or 1859. What Dr. Gillette wishes to say concerns cataphoresis in living dentine, and seems to be a plain statement of facts only. Dr. Gillette read some of Dr. Peterson's conclusions in regard to the subject.

The chairman announced as the committee on the furnishing of the museum and library in Washington the following gentlemen: Drs. Donnelly, of Washington; Taft, of Ohio; McKellops, of Missouri; Abbott, of New York; and Morgan, of Tennessee.

In the report of Section IV. Dr. Wilson stated that Dr. Bödecker's researches have been revised and published in book form during the past year. The section has two papers to offer,—one a series of studies on the effect of continued irritation upon the dentine and enamel, by the chairman of the section, Dr. Abbott, and the other by Dr. Vida A. Latham, of Chicago.

Dr. Latham's paper, "A Case of Diffused Non-Suppurative Lymphadentitis," was read by title.

Dr. Abbott's paper was then read, and was followed by the paper of Dr. Cryer, of Philadelphia, entitled "Studies of the Maxillary Bones," which was beautifully illustrated by stereopticon views and lantern slides. The latter paper is from Section VII.

DISCUSSION.

Dr. Barrett.—It was my pleasure to examine the specimens of which these are photographs this afternoon. They were a revelation to me, and have modified my views of anatomy as I conceived them before. There are many points which are made clear by the specimens themselves, which are not seen in the photographs. There is probably no practitioner of any experience who has not had cases of diseases in the antrum which to him were incomprehensible. Such a case came into my own practice recently, and I operated three different times, and finally I opened through the external alveolar plate and the alveolar process until I could explore with my finger. I expected to find some foreign substance or some tumor formation. There was absolutely nothing of the kind, and there seemed to be no cause for the amount of discharge that took place. I am satisfied, after seeing Dr. Cryer's specimens, that the probability is that there was a continuous discharge from the frontal sinus through the mass of the ethmoid into the maxillary sinus instead of the nasal sinus. The specimens show so clearly the possibility of a penetration that it seems to me extremely probable that that was the case. The diagnosis of the case which troubled

me must have been due to the infundibulum discharging into the maxillary instead of the frontal sinus.

As to the frequent neuralgias which we find in connection with the maxillary nerve, there has been shown by the specimens that not infrequently is it the case that the root of an inferior impacted tooth may penetrate within the inferior maxillary canal and thereby cause all sorts of irritations. There are many other points which have not been brought out to-night which are clearly demonstrated in the specimens themselves. Many of the points that were demonstrated here are of great interest. I wondered this afternoon why I came here. I had not gotten enough for myself to pay me for coming at all,—that is, the papers and discussions which were of interest to others had not been points upon which I was specially interested, but an hour or so with Dr. Cryer paid me more than a hundred times for coming to this meeting. It seems to me, from illustrations of this kind, which incontestably demonstrate some of the aberrations from ordinary normal structure in bone, that those demonstrations will account for a great many of the pathological cases which heretofore have been incomprehensible to us. It has been wonderfully instructive to me, and it must be to any one who attempts to perform even the minor surgical operations of the mouth. They will find the real key to the correct diagnosis of many cases that have heretofore troubled the best pathologists.

Dr. Marshall.—I want to express my appreciation of the work of this evening. Especially do I want to thank Dr. Cryer for what he has done in this line. There are so many points that he has brought out that are new and startling that there is not time to speak of all, so I will just refer to one, and that is the location of the opening into the antrum. The later methods of treatment, coming to us from Germany, as to antral diseases, are to open through the nose,—the natural opening. I have made some attempts in that line and succeeded sometimes, but in the majority of cases I have not been able to pass a probe into the natural opening of the antrum through the nose. I have always tried to pass it into the middle meatus, following about an inch and a quarter, working sometimes for an hour (under anæsthetics, of course), and I have failed. I shall not hereafter make any more attempts to work through the natural opening, if the majority of individuals have the opening as shown on the screen to-night.

Dr. Patterson.—The extreme pain which we often find resulting from the extraction of impacted, partially erupted wisdom-teeth,

lasting for days and sometimes for months, finds ready explanation after this exposition. Their removal requires sometimes a great deal of force. The roots are pressed upon the nerve, which they enter, and consequently are bruised and left in such a condition that pain results for a continued time; nothing but opiates will give the slightest relief. The difficulty in the diagnosis of these pains is by this exposition made simple.

Dr. Thompson.—It occurred to me that this could be made interesting by studying the skull from early stages onward. I desire to add my personal thanks and congratulations to Dr. Cryer for his work.

Dr. Brophy.—It seems quite likely that Section VII. will not have an opportunity to present anything more during the sessions of this Association than has been presented this evening. As chairman of the section, I feel very proud of the work we have done, and I think we have accomplished a great deal in the presentation of this subject this evening.

In the event of our not being able to bring before the Association the additional matter we have, which amounts to a great deal, we certainly will feel satisfied with what we have done. There is so much to think of in connection with what has been exhibited here by Drs. Cryer and Abbott that it is almost impossible to allude to even a few of the things. I took occasion to interrupt Dr. Cryer when he referred to the inferior dental canal, and want to say that I do not quite agree with the gentleman in changing the name of the passage to a tube. It has so long been known as the inferior dental canal that I am of the opinion it would be better to allow it to retain that name than to suggest a new one. I called attention to the fact that we may have excementosis, and thereby produce the neuralgia which we have in those cases, and which we cannot easily diagnosticate. I believe this is true in the case of children passing through the period of eruption of the teeth, and while it is generally held that the eruption of the teeth is purely a physiological process, there are times when that process is interfered with, and we have a purely pathological condition established from this cause alone. If absorption does not go on equally with the process of development of the root, we have exerted on the inferior dental canal a pressure which will cause the general disturbances which are often found. The relation of the frontal sinus to the antrum opens up a new field for investigation. While it has been known that these relations sometimes exist, I do not think it has ever been so conclusively shown as it has been this evening.

I wish to thank Dr. Cryer for his work in this direction, on my own behalf, and I may also venture to say on behalf of my colleagues engaged in educational work. I would like to know if it is not possible for us to secure slides such as these for the purpose of spreading this information among the students of the various colleges of our country. I do not know that it can be done, but I presume it could. It would greatly facilitate the work of teaching the anatomy of these parts to the students. I think the demonstrations and illustrations this evening will show the value of the careful study of anatomy in our dental colleges.

Dr. Stellwagen (of Philadelphia).—I have long desired such a series of sections as we have had exhibited this evening. I have long felt convinced from the examination of a number of these specimens of the mouth, and particularly the superior and inferior maxilla, that this condition which we see here so distinctly illustrated existed,—that the antrum itself was not a simple cavity, but it seemed to be a compound cavity. I found, many years ago, in attempting to treat several sinuses, that it was almost impossible to satisfactorily wash out an antrum with a single opening, unless that opening were very large. Therefore years ago I taught, and I believe I have had such almost universal success that there has been no objection made to it, that in almost every case where there is antral trouble we can succeed in half the time, or perhaps less, in the treatment by having two openings into it. The one which I prefer to use for the purpose of injection and for the purpose of washing out should be from the vestibule of the mouth, from the front of the alveolar process, or from the side, and the other in the roof of the mouth. You will find in many cases where the teeth have been the cause of the complication that there does not require to be any bone removed whatever from the palatal process to pass through it into the antrum, or through the floor of the antrum. In a great majority of those cases this floor itself, so far as the osseous structure is concerned, has changed and portions been removed, so that the mere penetration of the cavity with an ordinary lancet is sufficient, generally preferring a lancet somewhat of the sickle-shape or curved. From the front passing through the process is an operation so trifling that I feel as if it is hardly worth dwelling upon here. and yet in my experience I found a wonderful delicacy or timidity on the part of a number of persons with whom I have conversed on the subject about opening through this little thin plate of bone. To-day, with a bur and engine, I do not think anything of passing through there. I was going to say it is

easier to cut through than an ordinary visiting-card. The syringing of the cavity is made as simple as it can be when there are two holes, one for the inflow and one for the outflow of the fluid that is used. I was amazed, a few weeks ago, at a case where the death and subsequent formation of something like cystic opening around the root of a right lateral incisor had passed on, and burrowed and worked its way backward until it had become one with the cavity of the antrum. Seeing the condition almost at a glance, I simply took up a lancet, and opened into the floor of the antrum. I remember a few years ago, when I spoke of doing that to a prominent surgeon of our city, he stated if I did that I would never be able to get it closed. I said, "Suppose I use iodine?" He answered that if I put iodine in, I would kill the patient. In about an hour I had the cavity well washed out with iodine, and the patient showed improvement within a few hours. In a few days the improvement was so marked that I considered her practically well. Sometimes I use a saturated solution of iodine, and sometimes put a few drops in water. If you use a very strong saturated tincture of iodine, do not use quite so much; allow it to be diluted by the contents of the cavity, and if you want to rinse out freely, just put enough into water to have a good color. I lay no importance on the matter of strength in these agents.

In washing out the cavity for this patient a few weeks ago, to my utter amazement, after sending her to the sea-shore for three days, as I thought a little tonic treatment would do her good, at the end of that time the whole trouble appeared to have healed up. I did not attempt to even pass a probe in at the roof of the mouth, for it seemed to have entirely healed. I presume there will always be a fistulous opening, but I look upon it as a very excellent safeguard. This, in my mind, is to all these troubles what a safety-valve is to an ordinary engine. It cannot blow up while that opening is there. Some years ago, the editor of one of our prominent journals brought his wife to me, and wanted an examination made of her mouth. I found a simple fistulous opening of an abscess. She had been under treatment for about three months, having it packed daily, and she was in great dread of some serious complication. I looked at it, and said there was nothing the matter but a fistulous opening, which was a good thing. I told her to leave it alone, and she looked at me in astonishment. I told her to come again, and she came to me occasionally, but never had any more trouble from that fistulous opening than I have from about half a dozen that I have in my mouth.

Dr. Kirk.—I have been interested especially in one phase of the discussion this evening. One gentleman said it had been wonderful, another that it was a revelation, and I was quite struck with the reception that this demonstration has received. I do not see anything wonderful or remarkable about it. It seems to me the most natural thing in the world that it should be so. Much of our knowledge of the anatomy of these parts has been erroneous. We have accepted the results of observation of the ancient anatomists with reverence, but they seem to be all wrong about it. Here we have a man who has the brain and the clear insight of things to go right to nature for his facts. I call attention to this thing in connection with the remark of Professor Brophy that it would be of great value if duplicates of these photographs be made. The demonstration is an evidence of the great value of going to nature for our facts.

Dr. McManus (of Hartford).—I have been very much interested in this, because it carries out an idea which I have had for a long time, and which was forced on me rather more thoroughly at our legislature, when a physician said any medical man could teach a dentist anatomy and physiology. We have evidence to-night of what a practical, educated dentist can do who sets himself about writing up and illustrating any point in dental anatomy. That is why we are all so pleased that we have had to-night a practical, earnest dentist to show us these things.

Dr. Cryer.—I am very much pleased with the remarks that were made as to my endeavor to illustrate that at which I have been working. It has been asked if duplicates of these slides could be obtained. I am under obligation to Lee Brothers & Co. in the matter. Some time ago, Professor Litch asked me if I would write a chapter on anatomy for the "System of American Dentistry." I said I would if they would use new cuts made directly from the subject. Lee Brothers & Co. promised to do so, and these slides are from photographs which will be made into half-tones for this work, and also for another work which will shortly be published. Of course, they would wish this work to come out first before these slides are given out. In a few days I will take my first lessons in photography. Sometimes the photographer does not know what is to be photographed, and I shall then be only too happy to supply the slides that have been asked for to any gentleman for educational purposes.

Adjourned.

April 9, 1895.—Fourth Day.—Morning Session.

The meeting was called to order by Dr. Watkins, who presided.

The minutes of the previous session were read and approved.

Dr. Ambler offered the following resolution:

Resolved, That it is the sense of this Association that the National Association of Dental Faculties can largely control the formation of dental colleges by passing a resolution refusing to admit any college to their Association of which the organizers did not first apply for and obtain permission from the National Association of Dental Faculties to organize such institution.

Resolution carried.

Dr. Crouse reported that it is the judgment of the Executive Committee on the Horace Wells Memorial matter that the same be, and it is hereby, referred to the Memorial Committee; and further recommend that this Association appropriate $250 for the memorial to Horace Wells, to be paid when the work is completed.

Report adopted.

Dr. Boice.—As there are no prospects of Section I. being reached, we would like Dr. Custer's paper on the electric oven to be read by title.

Dr. Ottofy.—I wish to introduce this resolution in regard to this matter:

WHEREAS, Dr. Custer made public his invention of an oven for the fusing of porcelain, and made public the process in Chicago and at the Ohio State Dental Society; and

WHEREAS, Dr. Taggart, of Chicago, also claims the originality of this invention; therefore be it

Resolved, That it is the sense of this Association that, inasmuch as both of these gentlemen are the claimants of this invention, the matter shall be referred to a committee of three, to report at the next annual meeting.

Dr. Crouse.—For the purpose of getting the work of this Association better in hand and simplifying it, and having the work of the sections more complete, the Executive Committee would offer the following resolutions:

Resolved, That at the session of the American Dental Association, to be held in 1896, the general sessions shall be held every morning, and at such other times as may, at the pleasure of the Association, be designated.

Resolved, That the sections shall be required to hold separate meetings simultaneously during the day, and that all papers pertaining to the sections shall be read and discussed in the sections.

Resolved, That at the general sessions one hour each session shall be devoted to the president's address, and such other papers as embrace the results of original investigations as may be designated by the proper section.

Resolved, That at the general sessions reports embracing only a syllabus shall be made of the papers which have been accepted at the individual sections, meaning hereby that the work must be done in the sections.

Resolved, That all papers which have been accepted by the several sections shall be published in the transactions of the session, with the discussions thereon.

Dr. Marshall.—This will be a radical change in our order of business, but I think it would be a good one. I am in favor of it.

Dr. Patterson.—How can so radical an action be taken without a consideration of one year? It seems to me that it should be done in a very full meeting. Efforts have been made in this direction before, but this matter should have more attention than we could give it at a meeting so slimly attended as the one this morning.

Dr. Crouse.—I think there is a law requiring that no paper of over twenty minutes' duration should be read except by title. This would be giving the committee on making up the programme some basis.

Dr. Fillebrown.—The members of the Association will bear in mind that it is only a rule for the next year, and it leaves it to the Asssociation at that time to remodel it, if it does not work well. It does not change any organic law, but opens the door for the Association to do as it pleases.

Resolution carried.

Dr. Kirk reported for the Committee on State and Local Organizations. He said, in pursuance of the authorization of the society, copies of the list of topics were forwarded to all the State and local societies of the United States, as far as possible. Acceptances were received from twenty-six societies. Reports of the discussions had upon the topics submitted were received from several of the societies. A number of the societies have promised to furnish reports upon the work, who have not done so owing to lack of time. The committee proposes to refer the report already received to the proper sections of this Association, to be incorporated in the section reports for the ensuing year, and for discussion next year. In view of the interest manifested by the societies in this work, the committee is convinced that this plan, looking to a closer affiliation of the many societies of this country, is a most valuable work, which should be continued on the same lines.

Motion made to accept the report, and the committee continued. Carried.

Dr. Ottofy reported on behalf of the Committee on Credentials, and his report was adopted.

Dr. Taft reported on behalf of the Committee on Necrology, in reference to the death of Dr. John J. R. Patrick and Dr. William O. Kulp; also Sir John Tomes, of England. The report was adopted.

Dr. Fillebrown.—The Committee on the Union of the American Dental Association and the Southern Dental Association report progress, and ask for further time. The committee found a general sentiment in favor of the union of the two organizations, with the name and constitution amended to meet the requirements of the present and future.

Report adopted.

Dr. Shepard.—Yesterday afternoon, a very enthusiastic meeting was held of the members of the Dental Protective Association, and by unanimous consent of all present, it was considered necessary that the matter should be brought before the American Dental Association, and I was instructed to make a motion that a short time be given to Dr. Crouse to present a short statement of the progress of the suits, etc., and that a few minutes be granted to three or four gentlemen to express their views on the subject to the profession, I move that the order of business be suspended to allow the matter of the Dental Protective Association to be taken up.

Carried.

Dr. Crouse.—At the meeting of the American Dental Association last year I described at some length the progress of the litigation. At that time the Dental Protective Association was in pursuit of a contract which existed between the International Tooth Crown Company and James E. Low. I could not find it for a long time, and when I did get it, we found that the Crown Company did not have as much title to it as we even thought they had. Low had not assigned it to the company. When the company was through with the use of the patent they could not dispose of it, but it reverted back to James E. Low. Testimony had to be taken in that regard, and we prepared a brief on that subject, which will be presented to the court, as to the prior use and validity of the patent and of the title. The case will be heard before Judge Wheeler, and it will be argued in Brooklyn. When I left the American Dental Association last year, it was on a summons to appear in New York. I went there and met our attorney there, and we found they were not ready to do anything, and I went home to Chicago. About three weeks later we were again summoned, and we telegraphed to New York to see if it could be adjourned; but not receiving an answer, we started for New York, and at Cleve-

land we received a telegram that the case would be adjourned ; but not trusting to that, we decided that our attorney should go on. We went before the court and were informed that the case would not go on until we had been notified. Our case is in good shape, but having a judicial decision before, we do not know what decision the court may make. The judge may say that as this patent had a judicial decision in its favor, he would refer it back to that federal district in which the decision was obtained ; but if he does not, we think he will compel the Tooth Crown Company to begin again, putting in James E. Low as a party to the suit. The case will be heard, one way or the other, within two or three months. If the judge allows the argument in regard to the testimony to go on, and decides on that, we believe we will be successful ; but he may refer it to the lower court, and that will necessitate another delay, and bring it before the Federal Supreme Court. In case the decision should go against us, we would appeal ; and if we are successful, the Tooth Crown Company would surely do it. We have suits pending with the Steadman patent, which is a removable bridge, and with other patents. I would like it understood that we are not through with the litigation. It is of great importance that we increase our membership, and I would like the other gentlemen to speak about it.

Dr. Jack offered the following resolution :

WHEREAS, This Association has recognized the importance of the work of the Dental Protective Association of the United States by having appointed each year a committee to examine the accounts of the said Association ; therefore be it

Resolved, That the American Dental Association recommend each dental society of this country to appoint one of its members to solicit subscriptions for membership in the Dental Protective Association.

Carried.

Dr. Abbott.—I have been considerably interested in this matter, as a matter of honor for the profession at large,—not personally, because I never made a piece of bridge- or crown-work in my life. I do not know much about it, and I do not want to ; but I do want to see these patents that are secured stopped ; and I am willing to give not only the ten dollars that is required to become a member, but I will increase that sum if necessary. I want the dental profession to be protected against these sharks that are all over the country. The question has been asked, What has been done with this great amount of money that the president of the Dental Protective Association has gotten into his hands? You will be sur-

prised to know that, with all the work he has done, and the amount he has saved the profession,—over six million dollars in the last eight years,—he has spent less than twenty thousand dollars. Nine-tenths of the dentists in the United States to-day have never paid a cent towards this. Soon somebody will publish the names of the men who are not connected with the Association, and those who hold patents will, no doubt, at once bring suits against all those who have neglected to join the Protective Association.

Dr. McKellops.—The dental profession does not seem to have any idea of what Dr. Crouse has been doing. The amount of money that has been saved to the profession is truly wonderful. When we go about through the country, and see these dentists and the suits which are brought against men, costing them from ten to one hundred dollars every year for those patents, we ought to do something about it. Every man should go among his professional brethren and into his society, and see that the men send in their ten dollars each. We need the money, and every man in the profession should make it his duty to put his shoulder to the wheel. I am willing to contribute, for we must have the money, and every man in the Association should think over this thing and take an interest in it. I have labored hard, and have gotten a great many names for the Association. I hope we will hear no more complaint about money, because we must have it.

Dr. Shepard.—At the meeting yesterday, which was informally called, there was great enthusiasm, and every one went away imbued with two or three new thoughts. One was the importance of the work, another that it was just and fair to Dr. Crouse that some one else should take up the work, and it was thought that all the future work of soliciting membership for the Association should be done apart from Dr. Crouse. He has raised all this money by his personal efforts, and now we must help. Dr. Crouse could tell you of a dozen suits that will come up. He will tell you of fifteen suits in Denver that he has fought successfully. There are many other patent combinations that are ready to present their demands for royalty, and are only waiting for an opportunity. We must have the money for the conducting of these suits, and also a large reserve fund which can be drawn upon in the next twenty-five or fifty years, or any time for emergencies. One hundred thousand dollars, safely invested, would make every dentist in the country secure from unjust claims,—because all the claims that are fought are unjust claims.

It is well known in the history of these litigations that the

monopolies attack some insignificant, humble, honorable member of the profession in a remote locality, without any money and very little nerve, who has one fear in life, and that is that he will be brought into court as a culprit. He is an honest man, but not a rich one, and they will get their judgment in a little district court. They get a hundred such judgments against a hundred feeble men, and the accumulative facts of those minor judgments so helps them that when larger suits are fought there are the decisions of a hundred different petty judges that tell the higher judge that other men have examined the matter and found the claim just. I could name many of them where the original claim had no foundation in justice, and every man knows this to be true. We must help in this matter individually, in our local societies, among our friends, and swell the membership list until it amounts to certainly ten thousand members. In accordance with a vote passed at the informal meeting yesterday, the committee on the Dental Protective Association were appointed to draft an address to the dentists of the country, independent of the Dental Protective Association itself. I will read you the draft of the circular that was proposed. It is to be signed by thirty or forty prominent members of the profession. We must give that support which was given to Moses of old on the mountain, when his hands became tired, to Dr. Crouse, for his hands have become tired; we must give the support to the tired muscle and the wonderful, active, acute brain, which does not yet seem to lose its fineness and its devotion to the interests of the dental profession.

Dr. Jack's resolution was carried.

The chairman called for the discussion of Dr. Gillette's paper, and there being none, the subject was passed.

Dr. Hoff.—I want to refer to formaldehyde. It is a very powerful germicide, and one of the best agents for treating root-canals that I know of as a desiccating agent. I have experimented a little with it as an agent for obtunding sensitive dentine, and in my experiments I have found that it is quite beneficial. It has a strong affinity for water, and on that account its use was suggested to me for obtunding sensitive dentine; but I found that if it were allowed to remain any length of time, there would be considerable irritation, especially if it were near the pulp. You can dilute the formaldehyde with chloroform in the proportion of about twenty per cent. of formaldehyde to eighty per cent. of chloroform, and add to this cocaine in various proportions. I have experimented with many proportions, beginning with five per cent. and

going as high as thirty per cent. I do not know that I obtained any good results from the cocaine, except that the chloroform, by diluting formaldehyde, makes it last longer. Great care must be exercised, and it should not be left in the cavity too long. Simply wipe out the cavity with the solution, and then dry it out with the hot-air syringe. The operation can be performed with very satisfactory results in ordinary cases. I have not experimented long enough with it to have any very definite data concerning it, but the principle upon which I used it was the faculty it had of taking up water.

Dr. Guilford (of Philadelphia).—I have experimented with this, and I find that, in reference to the pulp, it is dangerous. I have removed a pulp with the use of it, and it came away in a leathery condition; so I think we should be cautious about its use. To replace iodoform I have been using for some time a preparation called loeritin, and I have as good success as I had with iodoform. It is odorless, which is a decided advantage.

Dr. Jack.—In respect to formaldehyde, I would say that, when it is used for disinfecting the exposed surface of the pulp, it should never be used in a stronger solution than five per cent. of formaldehyde.

Subject passed.

The president appointed on the committee in regard to the investigation of the Custer and Taggart invention the following gentlemen: Drs. Molyneaux, Holland, and James G. Palmer.

Section I. reported a paper entitled "Some Principles relating to Bridge-Work," by Dr. Henry Burchard; the same was read by title.

Dr. Brophy stated that seventy-two papers have been printed on subjects pertaining to anatomy, pathology, and surgery of the oral cavity. It seems unnecessary to read the titles of these papers and the names of the journals in which they were printed, and it would be well to pass this over to the Publication Committee and have it appear in the printed transactions. This seems to be the best report to make of the work of the section, inasmuch as it enables any one who desires to look up the subjects to find them with very little difficulty by simply referring to the transactions.

The section also has a paper by Dr. Barrett, and one by Dr. Ambler, and one by Dr. Brophy, entitled "A New Method of performing the Operation of Staphylorrhaphy."

Dr. Marshall commended the operation of Dr. Brophy, saying

that he had used the method for two or three years, and believes that it is one of the best we have.

Dr. Brophy said he had performed this operation in a large number of cases, and it gave better success than any method with which he was acquainted.

Subject passed.

Dr. Peirce stated that Niagara Falls and Saratoga had been suggested for the next meeting. Dr. Weeks showed a communication from the Twin City Commercial Clubs of St. Paul and Minneapolis. These clubs each have a membership of about one thousand members, representing the younger business and professional element of the two cities; they are both social and business in their aims, and they cordially invite the Association to hold its next meeting at St. Paul and Minneapolis.

Dr. Hoff suggested White Sulphur Springs, Virginia, as a desirable place.

The society proceeded to vote for the place of meeting for 1896, and Saratoga was found to be the choice. Drs. Hoff and Luckey were the tellers.

Dr. Stockton.—We have heard with great regret of the serious illness of our beloved president, Dr. Crawford. He said it was the regret of his life that he was unable to preside at this meeting. I remember eight or nine years ago that our then president, Dr. McKellops, was very ill during the time of our meeting. We re-elected him, and it was just the elixir he needed, for he became well again. I think it is the elixir that Dr. Crawford needs, and I move that the secretary cast one vote for Dr. Crawford as president.

Dr. Crouse objected, and the regular balloting was then proceeded with, with the result that Dr. Crawford was elected.

A committee was appointed to immediately inform President Crawford of his re-election, and Drs. Fredericbs, Stockton, and Patterson were appointed on such committee.

The other officers elected were, First Vice-President, Dr. McManus; Second Vice-President, Dr. Fillebrown; Recording Secretary, Dr. Cushing; Corresponding Secretary, Dr. Chase; Treasurer, Dr. Morgan.

Executive Committee.—Drs. Crouse, Ottofy, and Jackson.

The committee appointed to wait on Dr. Crawford and inform him of his re-election, having returned, reported that they were unable to see him, but saw Mrs. Crawford, who informed them that Dr. Crawford was somewhat better. She expressed her gratifica-

tion at the re-election, and said that the committee could say that Dr. Crawford would accept the same.

Dr. Fillebrown read a letter from Dr. Crawford in which he expresses his regret at being unable to preside at the meeting, and expressing his thanks to the officers for their efficient work during the past year, and particularly to Dr. Emma Eames Chase, the corresponding secretary.

Dr. Donnelly moved a rising vote of thanks to Dr. Watkins, the first vice-president, for the able and impartial manner in which he has presided over the meeting.

Dr. Fillebrown was called to the chair, to represent the installation of the newly-elected president.

Dr. Watkins thanked the society for the courteous way in which they had treated him while he presided over their meetings.

Drs. Harlan and E. T. Darby were appointed on the Publication Committee, the secretary of the Association being *ex officio* a member of such committee.

The secretary read the final minutes of the session.

Dr. Jackson reported that the Auditing Committee had examined the books of the treasurer and also audited the accounts and found them correct.

Report accepted.

The meeting thereupon adjourned to the first Tuesday of August, 1896.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A MEETING of the Institute was held at the Polyclinic College and Hospital, 216 East Thirty-fourth Street, Tuesday evening, February 4, 1896, at eight o'clock.

The vice-president, Dr. C. D. Cook, presided, and introduced Dr. R. H. M. Dawbarn, professor of Surgery in the Polyclinic College and Hospital, who gave a clinical lecture and surgical demonstrations, as follows:

Dr. Dawbarn.—I notice that the cards of invitation announce a large number of demonstrations, and in order not to disappoint you I have brought some living subjects.

This young man, twenty-seven years of age, developed a sarcoma of the nasal pharynx. Its attachment was partly from the middle turbinated bone and partly from the pharynx at the base of the skull. It was so extremely vascular—bleeding freely on

the slightest touch—that another surgeon who was asked to operate on it declined to do so because he thought the patient might die under the operation. Before he came to my hands Dr. Lederman had made thirteen injections of antitoxine, prepared from the streptococcus of erysipelas and the bacillus prodigiosus. By the time he reached the thirteenth injection he declined to go on, thinking there would be a funeral; and, indeed, they had wofully sapped his strength. There had been absolutely no benefit from this treatment; and there is hardly a doctor in New York now who has any confidence in injectional treatment save for the variety of sarcoma known as spindle-celled, and even that is *sub judice*. In the giant-cell and the round-cell variety antitoxine treatment proves absolutely useless, and it is a question whether in any other variety of sarcoma any better results are obtained by this method than from the injection of picric acid or of pyoktanin or methylene-blue. In this case the question arose whether I had a right to use the knife at all, because he bled so profusely. I started by tying both of the external carotids. You will notice that his neck shows a scar where I did that on each side. The operation was done last June, just before I went to Europe, and when I returned, in September, I found to my great delight that in the interval the tumor had shrunk to about a quarter of its former size from having almost its entire blood-supply cut off by ligation. If the circulation would only remain in that diminished condition we could expect a permanent shrinkage of the abnormal growth. The tumor remained small for two or three months further, and he said he felt better than he had for two years. Then it began to grow again from increased blood-supply, and it became a question of its removal. He consented to have that done as offering the only chance for his life. It was a desperate operation. I have never had quite as bloody a one, and that was a considerable surprise, because after having ligated the carotids we would not expect it. The hemorrhage was doubtless due to the fact that collateral circulation by anastomosis had been completely set up. The operation was done in this room three weeks ago. I will illuminate the mouth with this small electric light and show you the cavity. The incision runs from the prominence of the malar bone horizontally just below the orbit to the nose, thence along the naso-facial groove to the middle line, splitting the centre of the upper lip, and from this point along the roof of the mouth, at its centre, back to the soft palate, thence between the hard and soft palate on the affected side until the cheek is

reached. The bone was partly sawn and partly chiselled along this whole length. The lower plate of the orbit was carefully preserved to maintain a support for the eye, which otherwise drops somewhat in the socket, producing a very objectionable form of diplopia. Upon incision of the growth the bleeding was very sharp. It came like pouring water from a glass. It was controlled by pressure of the finger until the actual cautery could be applied. I now show you the tumor preserved in Müller's fluid; and here, too, I hand you the bones removed in this case. These are the entire superior maxilla (save its orbital plate), the palate bone, the entire right turbinated bones, and about one-half of the malar bone. When the flap is stitched together over this great gap the deformity, as you see, is remarkably trivial. With a good dental prosthetical appliance, including a plumper for the cheek, I think no one at a distance of six feet would notice that anything had been done. Furthermore, if there should be a recurrence it can easily be reached through the free bony gap which is left. It will be a question for you gentlemen to decide for this patient, who to-morrow leaves the hospital, how best a half set of artificial teeth may be supported, whether part of the pressure could be brought to bear during mastication upon a broad leg of hard rubber carried up to rest against the orbital plate.

To replace the blood that was lost, while the subject was still on the operating-table, we injected into a vein at the bend of the elbow over two quarts of water as hot as the hand can bear, boiled and filtered, and containing about a heaping teaspoonful of common table-salt to the quart. Also a little strychnine was used hypodermically. The conjunction of these two forms the best means of preventing shock in grave operations in which the hemorrhage has been considerable. The result of this injection of warm salt-water was simply wonderful. Before we began to inject it the pulse was 140, and when we had finished it was down to about 80. Five years ago I spent my spare time during an entire winter experimenting, in the Columbia College Physiological Laboratory, on dogs in this matter, injecting after the withdrawal of blood hot salt-water in various degrees of strength and heat. In one instance, my assistant and myself both forgot to put any salt in the water, he supposing I had done it and I supposing he had; we injected plain warm water, and the result was that the dog died almost as quickly as if prussic acid had been given him. Professor Curtis, of the college, said death was due to the fact that plain water has the power to dissolve out the coloring matter from the red blood,

thus destroying the red-blood cells. The addition of even six-tenths of one per cent. of common salt prevents this bad result.

I want to show you the latest improvement in the Nitze electric cystoscope. I got this while in Europe last summer. It is used for the illumination of the bladder in searching for possible stone or possible tumors, and to determine whether pus is entering from either ureter. We will use it here to illuminate the pharynx of this patient whose sarcoma operation I have just described, and you will be able to see with the clearness of day the walls of the cavity, and how much is left of the palate and interior of the nose. We will also, later, use this electric-light cystoscope to determine whether there is or is not turbid fluid, such as pus, in one antrum of Highmore. In illuminating the bladder that viscus is first washed out and filled with water.

This next patient from my clinic is a woman from Germany. She tells me that she has had trouble that involved the upper jaw for a year past. She says that she herself removed with her fingers a piece of flesh from the region of the jaw last summer. I find a condition which is in all probability a malignant epulis. I would like to have the opinion of you gentlemen who have had more experience in that line than I have. There is now some gingivitis, an accumulation of tartar, some inflammation, and some recession of the gums. Several of the teeth are loose. The epulis occupies the region of the alveolus corresponding with the right upper canine, and extending back to the first molar tooth, evidently springing from the sockets of the canine and the bicuspid teeth. We shall excise a small piece of the growth, and be guided in determining how much of the jaw to remove by the pathologist's report as to its nature.

[Note.—It proved to be a giant-cell sarcoma, and a large part of the jaw was accordingly excised at Professor Dawbarn's next clinic.]

Now I will give you some demonstrations on the cadaver. The first thing on your programme that would be of much interest is a demonstration of the section of the lingual nerve for cancer pain. When you have cancer of the tongue to deal with, an operation is always indicated right away. If the patient comes to you early, it will probably be sufficient to remove one-half of the tongue, as the growth commonly begins at the lateral edge; and if you advise the removal of only one-half of the tongue, the patient will perhaps submit; but if the patient comes to you at a later stage, and you have to suggest the removal of the whole of the tongue, he

will be likely to object, and procrastinate until it is too late to hope for cure. In excision of the tongue most surgeons deem it wise to tie the lingual artery. There is practically no anastomosis between the two lingual arteries; as shown by the fact that if you inject one side of the tongue through one of the arteries, with some blue coloring matter, for example, one-half of the tongue will be absolutely blue and the other half will remain red. The same statement applies to the lymphatics. For that reason cancer does not readily spread from one side to the other, and the early removal of the affected side will often suffice. If one lateral half of the tongue is to be excised, the preliminary ligation of one lingual artery will permit an almost bloodless operation. Even in case the cancer has gone so far as to make a radical operation hopeless, the patient's life can be prolonged for months by tying the lingual of the affected side, or, better, both sides, and thereby depriving the growth of much of its nourishment. And suppose a case comes to you so late that the cancer has already involved the wall of the pharynx or the buccal surface, and a radical operation is hopeless. The patient is suffering agony; every time he moves the tongue it gives pain, and also every time he attempts to speak or swallow, and there is also excessive drooling of saliva. Here, by a simple operation that is absolutely safe and does not occupy more than ten seconds, this pain can be instantly relieved, without the taking of a particle of morphine, and that half of the tongue made so devoid of common sensation that a red-hot needle could be run through it without being felt. That operation is section of the lingual nerve. This we do by introducing within the mouth a curved, sharp-pointed bistoury, and making a cut against the ramus of the jaw running from a point three-quarters of an inch behind and below the grinding surface of the last molar tooth to that tooth. This cut divides the nerve with certainty.

Now, perhaps, you would like a demonstration of the operation for the removal of a considerable portion of the inferior dental nerve for the relief of tic douloureux, cases in which some doctors mistakenly advise the patient to have teeth out, and perhaps half the teeth in the lower jaw are removed without giving relief. I have seen several cases like that, as all surgeons have. When medicinal means have failed a section of the offending nerve should be removed at a reasonably proximal point. We make an incision downward along the rear border of the ramus, then along the lower border of the body of the lower jaw, the limits of the incision being the facial nerve above and the facial artery below. There

is no artery of any importance in this region. This so places the scar that it will hardly be noticeable. Next the flap is reflected from this incision, including the periosteum with it, which leaves the outer surface of the ramus absolutely bare. Now, as you see, I chisel away a strip of bone an inch and a half long from the ramus, exposing the nerve, which is about the size of a knitting-needle, where it runs downward from the inferior dental foramen on its way to the teeth and the mental foramen. As long a piece of the nerve is excised as possible. Some surgeons trephine instead of chiselling, and then replace the trephine disk, which, of course, contains in its substance a corresponding piece of the nerve, and turn that disk a quarter of a circle, in order to prevent the nerve redeveloping by any possibility along its canal. The flap is now replaced, the divided periosteum being stitched at the point of incision in order not to lose the value of the masseter muscle, which was reflected with the periosteum from the ramus of the jaw in the operation, but is now restored to its former place.

We now know that bone deprived of its periosteum will still live; and in trephining from the skull it is customary, if an aseptic operation is being done, to save the trephine disk, wrapping it in a warm, moist, aseptic towel until the operation is finished, and then replacing the disk upon the *dura mater*. In about fifty per cent. of the cases this bone lives. If it happens to be bone having very little cancellous tissue, a still better chance for its life will be afforded by chiselling it into a number of fragments, as it is nourished by capillarity from the surrounding plasma, and the shorter the distance of the capillary movement the better the nourishment.

In surgery upon the skull-bones there are several ways in which to attack them. One is to cut our way through with a coarse bur in the dental engine. Another is the rongeur forceps. Our German friends almost always use chisels or gouges. That is all right in very cautious hands, but in brain-work it would be a trifle late to apologize after the gouge or chisel had slipped. And the constant jarring adds to the shock. If you use the chisel in the tic douloureux operation you press against the jaw so as to prevent as much as possible the jarring of the joint. Another way is to use a trephine, as I have described.

I will now show you the anatomy of the ligation of the lingual artery. I can demonstrate that ligation in two minutes, and—not to waste your time—will make a rapid sketch of its relationships in a minute and half more. [Dr. Dawbarn here illustrated his operation by a drawing by colored crayons on the black-board.]

This is one of the arteries that you can always depend upon to be where it ought to be. I have demonstrated it now eleven times on living subjects, and nearly three hundred times on the cadaver, in my operative surgery classes here; and I think those surgeons who have found anomalies in the course taken by this artery have simply not gone where they ought to have gone.

Now, I will ask you gentlemen, if you care to do so, to compare this dissection with the sketch that I have made on the black-board. Here is the posterior tendon of the digastric, here the anterior tendon of the digastric; here is the mylo-hyoid, which is drawn on the board in blue; here is a portion of the hyo-glossus, shown there in red. The twelfth nerve passes across and disappears under the mylo-hyoid, as in the sketch. Before I destroy this I will show you, by cutting through the hyo-glossus, the position of the artery running up towards the tongue. As you know, every artery in the dead subject looks flat. That is the only artery of any size in that region. It looks flat, even appears a little grooved; but during life, being full of blood, looks cylindrical. I will also show you with the needle the channel in the artery.

Nasal hemorrhage is something that we all ought to know how to treat, and it is inadvisable to wait more than a moderate time, trying the various remedies that may possibly succeed and are quite as likely not to succeed, before using means that are absolutely certain. Such a case (save the excessively rare contingency of hæmatophilia, which one may not see in a lifetime) can always be controlled in two minutes' time, to an absolute certainty. In mild cases we first gently plug the interior of the nose on the bleeding side with gauze, or a strip of handkerchief, soaked either in peroxide of hydrogen, a saturated solution of antipyrin, or dampened with a weak solution of cocaine up to five per cent. If these fail, then the scientific thing to do is to look for the cause of the bleeding, which is generally found in the anterior portion of the septum nasi, where, with a good light, blood will be seen trickling from the artery. By means of a metallic point, heated nearly red-hot and applied to the surface, it may be cauterized, and the bleeding checked almost at once. In the rare contingency where the bleeding-point is so far back as not to be seen with the aid of a forehead-mirror and reflected light we can always control the hemorrhage instantaneously by tamponning the nares. If the anterior naris is plugged, the posterior should be also, because otherwise the blood may continue to flow into the pharynx and be swallowed, the patient not realizing how much blood is being lost.

In all the works on surgery a Bellocq's canula is figured; I don't know why, because it is a needless instrument for this purpose. All that one needs for tamponning the anterior and the posterior naris is an ordinary soft-rubber catheter, such as is used for drawing urine. As you see, I now pass this through the nostril on the affected side, and presently its point appears in the pharynx. Seizing this with a pair of thumb-forceps, or a dressing-forceps, it is drawn out of the mouth; so that now one end appears through the nose and the other out of the mouth. Upon one of these ends we tie now a doubled piece of soft twine, say a yard long, and by completely withdrawing the catheter the twine is drawn into place; so that now we have the doubled twine entering the nose and escaping at the mouth. Upon the middle of this doubled twine we tie our posterior plug, folded from a piece of handkerchief, about the size of a large marble, and draw it into place. The anterior plug, much smaller, is now tied in place, aided by the doubled twine, and we are able to do this more tightly than we could have done with a single piece of twine. Now, the front and the back of the nose being absolutely closed, and connected by a tight string, all the blood that can flow will be the small amount which may fill one-half of the nose. The loose ends of string coming from the mouth and nose are tied together.

Such a tampon is left in place twenty-four hours, and the patient is warned not to try to blow out the blood-clot subsequently. This method of tamponning is much less annoying to the patient, uncomfortable though it is, than to insert a rubber or other sheath into the nose, and distend it with either water, air, or a gauze packing. The interior of the nose never was meant to be subjected to any other pressure than that of the atmospheric air. By the first method of tamponning the very sensitive turbinated bodies are not subjected to pressure; by the second method, which I have just said is extremely uncomfortable, they are subjected to a direct pressure, which is why I disapprove of it. The patient should be sitting upright. If you use a little cocaine spray, the operation is hardly annoying at all. As to how firmly we draw this rear tampon into place, a good rule is to draw it just for a moment with almost force enough to lift the patient's head by it. If peroxide of hydrogen is used, an objection to it is that it is irritating. In a certain case where I applied it for the purpose of dissolving the membrane in diphtheria, after I had used it two or three times my patient told me she preferred the diphtheria. Its irritating quality is due to a free acid, usually hydrochloric, which

is put in by the makers to prevent the tendency of the excess of oxygen—which oxygen alone renders it of value as an antiseptic—from escaping. On account of this free acid it is very irritating to the membranes. If you will take a sample of any peroxide of hydrogen in the market, and touch a little of it to the conjunctiva of your eye, you will not wish to repeat the experiment. I make it a rule to neutralize all peroxide of hydrogen before use by putting a little ordinary soda bicarbonate, pinch by pinch, into the amount of peroxide which I intend to employ at that sitting until it no longer effervesces, when the free acid is neutralized. The peroxide itself will remain just as efficient as before for the purpose for which we employ it.

Dr. McNaughton.—Has not pyrozone the same objection?

Dr. Dawbarn.—I am not certain about free acid in pyrozone. It may be so. It could be readily ascertained by testing with litmus paper.

If you should meet with a severe case of nasal hemorrhage where even a soft-rubber catheter is not to be had, a twig from a willow-bush, or a stiff shoe-string, with twine and a bit of handkerchief, will answer the purpose for tamponning. The operation is even more easily done on the living subject than on the cadaver.

Œdema of the glottis is an accident that is so rapidly fatal if unrelieved, and yet so safely curable if treated properly, that every oral specialist should be familiar with the proper technique. It may be remembered that the minister to Russia, first appointed during President Harrison's administration, died at the Fifth Avenue Hotel, in this city, while *en route* to Russia, of a sudden development of this trouble, in the absence of a doctor. Had a doctor been on hand, his life could have been saved to a certainty. It is a condition in which two large dropsical bags, covered with mucous membrane, develop on either side at the top of the larynx, and nearly or quite meet in the middle, thereby obstructing the respiration. The pathological condition is an acute inflammatory distention, with serum, of the aryepiglottic folds. Now, if we take a curved, sharp-pointed bistoury, and wrap it with string or adhesive plaster down to within a quarter-inch of its point, we may safely guide it by the left forefinger, passed into the mouth and behind the tongue, which feels these bags of water, and cut them freely on either side, which brings immediate relief. There is no operation that is simpler than this one for the relief of œdema of the glottis.

The next operation will be one that is of interest to every one,

—namely, how to relieve that accident which is the source of occasional fatality, choking to death from "swallowing food the wrong way." It generally occurs while laughing or talking and at the same time endeavoring to swallow. A morsel of solid food enters the larynx, and is caught at the narrowest point,—the chink of the glottis (rima glottidis). If a medical man is present, it would be a lasting disgrace to him should the patient die, for relief may be obtained in a moment, with a single cut of a pen-knife in a perfectly safe region. This I will now demonstrate. You will observe that when the head is thrown back there are two prominences of the larynx, easily distinguishable by sight or touch. The uppermost is the so-called "Adam's apple," the lower is the inferior edge of the larynx, or cricoid cartilage. Between these is a small depression, into which always the tip of the finger may be made to sink. This depression, the crico-thyroid space, is where the cut should be made; guarding the pen-knife with the finger and the thumb so that only a quarter of an inch of the blade is permitted to cut, and with a single thrust, cutting horizontally, this crico-thyroid membrane is opened, and we enter the free air-space beneath. We cut horizontally because thereby, as I now show you upon this papier-maché model of the larynx, the space is wider transversely, and we thereby get more room, and also the crico-thyroid artery is less likely to be divided. At once the patient can inhale freely; and now through the cut we introduce some blunt instrument, like a lead-pencil, a hair-pin, or even a match, and dislodge upward the food which has caused the trouble; the patient can then cough it out. The operation is not tracheotomy, but laryngotomy. The only blood-vessel there is the little crico-thyroid artery, and that, if cut, can easily be controlled with the finger.

Dr. Bogue.—Can Dr. Dawbarn tell us something about that rather recent instance in which a cork was drawn into the trachea, and an operation performed for its removal?

Dr. Dawbarn.—That was a case in the practice of Dr. Fowler, of Brooklyn. A minister inhaled, while laughing and talking, a cork that he had just drawn from a medicine-bottle with his teeth; this cork passed beyond the larynx and into the windpipe, and he allowed some hours to elapse before calling in surgical assistance. At that time the cork was found lodged in one of his primary bronchi. Tracheotomy was done, and an attempt was made by Dr. Fowler, with a most ingenious instrument on the corkscrew principle, to extract the cork; but the mucous membrane had become so swollen from inflammation caused by this foreign body as to

hold it firmly and render its extraction impossible. A portion of the cork did come away, but the remainder proved not removable, and the patient had to die with it in. Dr. Fowler attempted, after failing from the front, to attack the rear wall of the thorax, but he found it an extremely bloody and dangeous road, and had to give it up.

Dr. Bogue.—How far from the vocal cords do you cut in the laryngotomy which you have just demonstrated?

Dr. Dawbarn.—The vocal cords are almost mathematically in the middle of the larynx, measuring from top of thyroid cartilage to bottom of cricoid cartilage. The space we enter is well below the middle, and hence below the vocal cords, and below the food caught between them.

For the reduction of a dislocation of the lower jaw the usual plan is to depress the rear part of the lower jaw while lifting the anterior part, making the thumbs, wrapped in a handkerchief, a fulcrum. As soon as the articular condyle is forced below the eminentia articularis the temporal muscle will at once draw the lower jaw back to its normal place. Sometimes stout corks placed between the molar teeth are used instead of the wrapped thumbs. In one case in my experience, sent to me by a doctor in Bridgeport, the patient for some months had had an irreducible double forward dislocation of the lower jaw. Reduction had been attempted in the usual way by several excellent surgeons, among them Dr. Bacon, of New Haven, the patient being under general anæsthesia meanwhile; therefore I did not waste time in repeating these efforts. Instead, I made two incisions horizontally just below the zygoma, exposing the articular condyle in its false position; and then, by introducing a stiff instrument and using leverage against the tubercle of the zygoma, I succeeded in accomplishing the reduction. Of course, leverage had to be applied on both sides and through both cuts. The result was excellent, only two thread-like scars now showing that anything had been done. This operation is an exceedingly rare one. Hamilton "On Fractures and Dislocations," for instance, does not even allude to the possibility that a cutting operation may be needed in old cases of this difficulty.

Dr. McNaughton.—After three or four years had passed would it be possible to reduce such a dislocation?

Dr. Dawbarn.—It would be possible by means of a cutting operation, but not otherwise, because the temporal and other muscles of mastication would have become very much contracted in the new position of the jaw.

The scientific way to make a diagnosis of suppurative disease of the antrum is by the aid of a small electric light introduced within the mouth, the room being meanwhile dark. The tissues of the front part of the face are thereby made translucent and illuminated. On the affected side, however, the antrum being partially filled with a turbid fluid, pus, this somewhat obstructs the rays of light, and that side of the face will be comparatively dark. The difference is striking enough to be seen even from a considerable distance. The less scientific way of making the diagnosis is to have the patient first use the handkerchief thoroughly, and then lie in such a position that the antrum can drain by its natural opening into the nose. If, after a very few minutes with the head in this dependent position, a considerable amount of muco-pus may be expelled from the nostril on this side by blowing, the diagnosis is very probable; especially so if in conjunction with the presence of pain and tenderness and some swelling of the soft parts of the front of the face over the antrum. The treatment of this condition, which is often not recognized, and is attributed to neuralgia or to dental difficulties, is extremely simple,—one of the simplest in oral surgery.

There are several routes whereby the antrum may be entered and the pus drained. It will be evident that some artificial entrance must be made, because pus, like any other fluid, will not drain up hill, and the natural opening of the antrum is at the junction of its roof and inner wall, so it would be necessary for a man to stand on his head to drain it that way. We must therefore attack its floor for permanent drainage. One way in which this can be done is through the inferior meatus of the nose on the affected side. A second way is by extracting a tooth, and drilling up through its socket. This latter method has always seemed to me not only needless, but distinctly objectionable, inasmuch as a tooth that is even partially sound is too good a friend to be lightly sacrificed. The simplest way, and the best, in my judgment, is the one I now demonstrate for you,—namely, to make, under cocaine anæsthesia, an incision about an inch in length, extending from behind the canine tooth, backward along the junction of the gum with the cheek. The superior maxilla is then exposed just above the alveolar process. The bone covering the antrum is here so thin that the lightest tap of any steel instrument will readily penetrate it. It is almost as thin as a sheet of paper. And the cavity extends for such a distance above the bicuspid and molar teeth that no one could fail to find it. The ordinary dental engine would,

with a coarse bur, give you entrance at once; or, if preferred, one may use, as I am now doing, a small gouge or chisel. An opening the size of the base of a lead-pencil is made, and through this the pus is washed out, some of the fluid escaping by the nasal passage into the nose. Preferably the peroxide of hydrogen is used once or twice daily for such irrigation. Following the washing, a short piece of rubber draining-tube is introduced, say half an inch in length, and is attached by a thread to the periosteum or the mucous membrane near the artificial opening. This tube is left in place until the discharge ceases. The advantage of this high incision, which nevertheless enters the floor of the antrum, is that the lip falls over this small tube in eating, and there will not be much likelihood of food making its way up into the antrum; whereas if a tooth is extracted, and the entrance forced through its socket, every movement of mastication tends to force food directly upward where we do not wish it to go. In certain very chronic cases we may have at a later stage to enlarge the bony opening, and with a sharp spoon scrape away the diseased mucous membrane, and sometimes the carious bone which in such cases may be found. The cavity is best when treated by packing daily, or on alternate days, with a long slender strip of iodoform gauze until all discharge has come to an end. I will now show you here what a large cavity the antrum is; with this bent probe you may examine its walls in all directions.

Dr. Bogue.—If the antrum is small, you simply make the opening farther back.

Dr. Dawbarn.—Yes. If not normally placed, the cavity is rather farther back than forward. I understood Dr. Bogue to say just before this lecture that he wished some questions answered in regard to cocaine. I will answer the questions now, if I can.

Dr. Bogue.—How do you use cocaine in this operation for antrum disease? After speaking of that please state a few general facts regarding the use of this drug in surgery.

Dr. Dawbarn.—I make a fresh solution every time, in the first place. You can get the tablets, half a grain or a grain each, and dissolve one in a little water. The trouble with a solution that you keep on hand is that it is not antiseptic at all. After it stands two or three weeks, if you examine it, you will find it reeking with microbes. Of course you can avoid that by adding carbolic acid in small amount (say one per cent.) to your solution, which will then keep well. Do not use bichloride of mercury, however, to prevent

microbic development in your cocaine solution, for this is chemically incompatible with the cocaine, which will at once be precipitated as a white, milky deposit. I believe one grain of cocaine injected to be perfectly safe in a person in fair health, although there has been a case recorded where one grain was fatal; a case of a weak old lady, operated upon for ectropion. I have not heard of any fatal case from this dose excepting that. Occasionally you hear of some unfavorable symptoms from absorbing one grain, and it is well to use not more than two-thirds or three-quarters of a grain. When cocaine kills, it kills by contracting the blood-vessels of the brain. Respiration first fails from acute anæmia at the respiratory centre. The heart beats rapidly and weakly, but only stops after respiration fails. That being the case, if you will use something that will dilate the blood-vessels you will prevent and obviate the ill effects. For this purpose glonoin may be used, which is a one-per-cent. solution of nitro-glycerin and alcohol. You can get it in tablets. One to two drops of a one-per-cent. solution is a safe dose. By dissolving a little glonoin with the cocaine solution the ill-effect will be obviated. I should say that one or two minims would correspond to half a grain of cocaine. Perhaps the simplest way to prevent possible cocaine-poisoning is to give the patient a good drink of whiskey at the same time with the cocaine. Whiskey also tends to dilate the blood-vessels and to stimulate the heart. It is, moreover, somewhat anæsthetic also.

Dr. Allan.—In case you had this bad effect of cocaine, would it be proper to administer whiskey?

Dr. Dawbarn.—Yes. But after having the patient lie flat, the most rapid stimulant you can use is aromatic spirits of ammonia, one or two teaspoonfuls in a half glass of water. You need not be afraid of killing the person with that or with whiskey. Every one has noticed that in coryza you cannot breathe through the nose. In such a case if you snuff up a little cocaine solution it will immediately restore the breathing capacity, and in five minutes your nose will be as free as if there was never any such a thing as cold in the head. The nasal passages will be perfectly clear. Nevertheless, it is of no real benefit, because it only temporarily contracts the blood-vessels, and the swelling soon comes back worse than before, and lasts all the longer because you have done it. I only mention that as showing the marvellous power cocaine has of contracting the blood-vessels, and that is the way it kills. By the way, disease of the antrum almost always comes from coryza. A cold in the head continues for some time, the mucus gets thicker,

the patient's cheek begins to ache, accompanied sometimes with fever and rigors.

Dr. Allan.—Does whiskey interfere with the action of cocaine?

Dr. Dawbarn.—No, not at all. It just occurs to me to say a word about pronunciation. The tendency is to pronounce this drug *cokane*,—a two-syllabled word, but it is properly pronounced co-ca-ine. A curious thing about this alkaloid is that its effects are only centrifugal; it travels centrifugally. That is why it is so ineffectual in dentistry, as you apply it in a cavity to the end of the nerve.

Dr. Bogue.—Is the effect on the lower portion of the nerve due simply to the drug being carried through the blood, or is there an absolute transmission in the nerve itself?

Dr. Dawbarn.—The latter is the case when the circulation is cut off temporarily. This is easily proved by injecting cocaine in contact with the ulnar nerve behind the elbow, the circulation being meanwhile shut off by a tourniquet. In a short while the little finger and half the adjacent one become completely numb. In dentistry you can benumb an upper central or lateral incisor by taking a little pledget of cotton and soaking it in a ten-per-cent. solution of cocaine and putting it in each naris close to the roots of the incisors, and leaving it ten minutes. You can then extract or fill the central or lateral incisor with almost no pain at all. I have tried it on myself, and know. It reaches the nerves of these teeth at a proximal point, so that the anæsthesia can travel centrifugally some distance. The nerve is benumbed, in other words, before it enters the root of the tooth.

Dr. Bogue.—Apropos of this use of the electric light for the purpose of making a diagnosis of disease of the antrum, it may be proper to say that light has also been used for determining the existence of death, a prize having been paid a doctor in Paris several years ago for a demonstration that whereas during life a bright light shining through the flesh between the closed fingers presents a pink hue from the circulating blood, after death the light shows no such pink hue, but an opaque appearance.

Dr. Dawbarn.—That is new to me. I had not heard of it. It is a very interesting fact, and I should like to try it.

On motion of Dr. Bogue, a vote of thanks was unanimously tendered to Dr. Dawbarn for his very interesting lecture and instructive demonstrations.

Dr. Cook.—Dr. Lord, our president, wished me to express his sincere thanks to Dr. Dawbarn for his kind attendance here this

evening. Dr. Lord was compelled to leave early in the evening. Dr. Dawbarn has given us a most enjoyable lecture, and his demonstrations were the finest I have ever had the pleasure of seeing.

Adjourned.

S. E. Davenport, D.D.S., M.D.S.,
Editor The New York Institute of Stomatology.

Editorial.

DUPLICATION AND REDUPLICATION OF PAPERS.

It is a very natural desire on the part of writers of papers to give them the widest possible circulation, and this desire seems very frequently to be out of all proportion to their value in a scientific sense. It is not unusual to find the same paper published simultaneously in several journals, much to the chagrin of the several editors, who, of course, have not been informed, at the time of the acceptance of the manuscripts, that the writer has forwarded his article all over the United States.

This duplication of papers has become an imposition upon the readers of journals and upon the editorial fraternity, of a very serious character, and it would be well, perhaps, if our contemporaries would keep a list, black list it might be called, of those writers guilty of this, and either bar them entirely from their pages or insist upon an affidavit accompanying each paper that the essay has not been sent to any other journal.

This to the average reader may seem of trifling import, and it is to those journals that, in any event, copy most of their material, but to those mainly devoted to original matter, and which carry a standing announcement that "no papers will be received that have appeared in any other journal published in the country," as the International Dental Journal, it becomes of grave importance affecting their reputation.

It is difficult to understand the real motive for this course in the minds of some very good and original workers, for the results of their labors are so truly of value that were these published even in an obscure journal they would be certain to be copied both at home and abroad; yet while this remains true, we very recently

have had evidence of this mistake being made to the injury of the writer and to the discredit of dental journalism. Some of the editors of Western dental periodicals made themselves merry over this, and conspicuously posted the standing announcement in regard to original matter. This is not very hurtful, but it serves to emphasize the fact that it has grown to be a common occurrence, and the victimized are regarded as being fit subjects for the funny men who manufacture paragraphs for that kind of dental literature.

There is another method of publishing, which, while different in motive, is very similar in character, that of having inserted in two journals the proceedings of one society. It is not probable that this will be extended, yet it occurs as the settled policy in one organization, at least, and possibly in others. The actuating motive here is not to give an increased circulation to the report, but to avoid discrimination against either one of two journals in which many of the members have an equal personal interest. This statement is made that it may be understood why a certain prominent dental society has its proceedings published in two journals simultaneously. This, while objectionable, is not a serious matter, and it is also a well-understood business arrangement.

We recently, very reluctantly, accepted an article emanating from a member of one of the State boards. It was published in this journal as the recognized duty of a professional periodical to hear all sides of a question, and it is trusted this literal interpretation will never be departed from, that all sides of a controverted question will be given a hearing and that without regard to the opinions held by the management. This paper it would seem was sent broadcast, and from editorial notices in several journals, it is inferred that the paper was not regarded as worthy of acceptance, and through this, the editor of this journal was saved the annoyance of having a series of repetitions.

If it be regarded as unprofessional to advertise the merits of a certain practice, it must certainly be equally derogatory to the individual to seek notoriety by the procedure mentioned.

The true scientist in any direction rests satisfied with the simple publication of the facts he has been able to discover and then quietly waits for the verdict, satisfied that if he merit it, it will be forthcoming in a degree favorable in proportion to the service rendered. It is this character which should be found worthy of emulation and not that of the empiric who flaunts from the house-top the extent of his knowledge and the value of his productions.

AN APOLOGY TO THE EDITOR OF THE "DIGEST."

Under the head of "Remarkable Misquotation" in the February number of the *Dental Digest*, the editor, Dr. Crouse, very properly takes the editor of this journal to task for misquoting him in the editorial entitled, "The War on Dental Colleges." It is needless to say that we endeavor to be correct always in quoting the language of another, not only that we may do no injustice, but for our own protection. An examination of Dr. Brown's paper abundantly proves that we were in error in this instance, and that Dr. Crouse had excellent reasons for his strictures. We regret the mistake, which was made by a too hurried examination of the manuscripts without proper subsequent reference to the printed page. In order that justice may be done Dr. Crouse, we quote from the *Digest* his remarks upon the subject in dispute: "A young man may be bright, a good student, and well-grounded in the classics, and yet an attempt to make a dentist of him would destroy his usefulness in life, make him a detriment to the community in which he practised, and not a credit to the dental profession. Therefore, the first six weeks of the college course should be spent in finding out who are properly qualified by nature, as well as by training, to be dentists, and those who are not fit should have their fees refunded, and should be persuaded to select a more suitable calling in life. In short, the 'plucking' should be done at the beginning of the college course rather than at the end."

Now, the expression quoted which seems to have roused our friend seems, to our comprehension, very near to his own idea. Credit should have been given Dr. Brown, the writer of the paper on "Dental Examining Boards and Preliminary Education," in which he says, "Now, as to a student's mechanical adaptability: granted a first-class education and the receptive qualities necessary for a good scientific education, of what avail is it 'if he hasn't it in his fingers,' as Dr. Eaton has so tersely expressed it? he will never make a dentist, and of this fact the colleges have as yet taken no notice." There seems to be a perfect unison of sentiment in these two quotations.

We do not care to follow the editor of the *Digest* in his criticisms of the editorial in the February number of this Journal. Those who have had a lengthened experience in college work are alone entitled to speak on the duties of deans, and we do not regard the editor of the *Digest* as a competent witness. A third of a

century of practical college labor has demonstrated to our comprehension that the views set forth in the editorial alluded to are correct; but if we are called in the future to revise our opinions, we will endeavor to seek light from some other quarter than the office of the *Digest*.

This constant iteration of what colleges and deans of colleges should do or leave undone, by persons having no practical experience, reminds us of a group of children theorizing as to what they will do when they become men and women. Experience will have demonstrated in after years that practical knowledge is very destructive to "castles in the air."

It is one thing to have the experience of a student, another that of a teacher, and still another that of the dean. Each of these positions gives special facilities for observation and practical knowledge, and we kindly recommend the editor of the *Digest* to acquire wisdom by a living experience, or, failing in the opportunity for this, secure a consensus of the opinions of those who have had the management of colleges for a decade or more, and we feel sure that they will agree with us that it is quite impossible to find out "in the first six weeks of college life" the natural bent of a young man. Had this judgment been exercised with some, now dentists of repute, we fear the writer of this would have made a serious mistake. There is, probably, no more embarrassing position for a young man without previous experience than a first year in a dental college, and he requires the kindly care of those intrusted with his education, and not crude criticism that may be very unjust. There is no more important study than the possible capabilities of young men, and, in our opinion, the man who imagines he can master this in six weeks, or even in a year, has a very poor conception of the difficulties of the task he has set himself to conquer.

CROWN COMPANY BEATEN ON BRIDGE SUIT.

The following telegram was received from Dr. Crouse as we were ready for press. Its importance will be appreciated.

"Chicago, Ill., March 23, 1896.

"Dr. James Truman:

"Have beaten Crown Company on bridge suit.

"J. N. Crouse."

Bibliography.

Dental Chemistry and Metallurgy. Fourth Edition; Revised, Enlarged, and with many Illustrations. By Clifford Mitchell, A.M., M.D. The W. T. Keener Company, Chicago, 1896.

This work of dental chemistry was originally reviewed in this journal upon the issuing of the first edition, with the feeling, after careful examination, that no more thorough text-book on chemistry had up to that time been published for the use of dental students, and this is more than ever emphasized on an examination of this, the fourth edition.

The author says in his preface, "The present edition of the 'Dental Chemistry' is an effort to provide the student with a course which shall include a large number of exercises in experimental chemistry, both inorganic and organic. More than one hundred new pages have therefore been inserted in the book, which are entirely practical in character. . . . Greater attention is also paid in this edition to the germ theory, ptomaines, leucomaines, and various toxines. . . . Descriptions of various new alkaloids and antiseptics will also be found in the chapters relating to them."

Examination of the new matter added in this edition shows careful condensation and a laudable effort to give all needed information upon topics of importance to the average practitioner, as well as to the undergraduate. If there be an error to be found here, it will probably be discovered to exist in the direction of too great brevity, for in the descriptions of many of the new agents the reader is left with but little more than the name. The difficulty with all writers of text-books is that, in their efforts to keep within reasonable limits, they are led into an unwise condensation at the expense of clearness of statement. This only applies to special parts of this book, and not to it as a whole.

While the author has labored to make this volume a text-book for colleges, he has gradually made it a very important reference-book for dental practitioners. In this direction former editions have been found of special value to the writer, and will be increasingly so in this the fourth. It certainly deserves a wide circulation among those who desire to be intelligent upon chemical matters.

HEALTH NOTES FOR YOUNG WIVES. By Aimée Raymond Schroeder, M.D. William Wood & Company, New York, 1895.

This book is intended for the instruction of young mothers during pregnancy and subsequent to the birth of the child.

The anxiety of this period can be measurably lessened by an intelligent comprehension of what is required on the part of the young mother. This the author of the small volume succeeds admirably in giving in a clear and satisfactory manner. The information upon its pages, if read, should add to the intelligence of every woman passing through this trying period.

While the writer states that the description of diseases is "foreign to this work," it would have increased materially its value if an additional chapter had been added on the care of infants previous to and during dentition.

It is one of the great errors in the education of young girls in that they are not taught much of the wisdom contained in this book before marriage, but if this has been neglected, this volume will become an excellent educator subsequently.

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY FOR 1895. B. H. Catching, D.D.S., Editor and Publisher, Atlanta, Georgia, 1896.

The issue of this important review of the labors of 1895 in dentistry comes to us promptly in March. The editor announces that he has added a new department, that of the "Science of Dentistry."

This volume contains abstracts from all the writings of the year worthy of special mention, or which may contain anything of a novel or of a valuable character.

Whenever this compendium is received it gives the impression of great labor involved in its preparation. If the articles could be copied into type exactly as originally printed the task would be comparatively an easy one, but were this plan adopted the volume would be bulky, and the readers would be few and far between. Hence condensation is important, indeed necessary.

It is strange that this effort of Dr. Catching has not met with the financial success its merits deserve. It is hard to understand this, for if there is one thing the dental practitioner needs it is to have the literature of the year in dentistry brought to him in the most concise form, and to be of easy reference. There is not a man of the fifteen thousand dentists in the country who can afford to neglect any opportunity to keep in touch with the ever-

changing panorama of prosthetic, operative, and scientific dentistry.

Many, doubtless, have felt and will continue to feel that there is not much of novelty as we go on year by year. This may be true, but the few grains of wheat to the bushel of chaff must be garnered that they may serve a purpose in the nourishment of the entire professional body. No calling can do without a *résumé* of its work year by year, and the three dollars necessary to secure this book should be forthcoming from a wide circle to encourage the publisher to continue this work upon ever extending lines.

It is gratifying to notice that the editor has added a department devoted to the science of dentistry. This greatly increases the value of the compendium, and will no doubt, in the future, be of ever-growing interest.

The publisher has been obliged to increase the price to three dollars. This slight increase is fully warranted by the heavy expense attendant upon the collection of material both at home and abroad, and should not prove a serious obstacle to its increased circulation.

Obituary.

WILLIAM H. DWINELLE, A.M., M.D., D.D.S.

The death of this distinguished member of the dental profession occurred too late last month to secure adequate data of his life-work. We are indebted to his niece, Louise Fiske Bryson, M.D., of New York, for the following interesting account of his life:

"He was born July 22, 1819, and was the son of Louise Whipple and Judge Justin Dwinelle, of old New England stock, and of French and English ancestry.

"He was instrumental, with Dr. Chapin A. Harris, in establishing the first dental college in the world; he was also the associate editor of the first dental journal ever published.

"Dr. Dwinelle studied dentistry first with Dr. Douglass, of Albany, N. Y. He was always fascinated by surgery, and forty years ago performed operations upon the jaw for removal and resection similar to those that are considered triumphs of modern surgery.

"He made a European tour in 1851–52, visiting the World's Fair in London, and wrote numerous letters for publication concerning medicine and dentistry.

"A treatise on crystal gold was prepared by him in 1855; also papers, in the early fifties, on the use of the microscope in clinical medicine and dentistry, and, in addition, wrote important monographs on scientific subjects.

"An omnivorous reader, books and pictures were his chief delight. At one time he owned a valuable library and art collection.

"He was always the friend of aspiring and struggling artists, students, literary and professional men, aiding them by money and encouragement.

"For many years he was a member of the Union League Club, National Academy of Design, Jockey Club, Historical Society, St. Nicholas Society, County Medical Society, foreign associations, and New York Odontological Society, of which he was at one time president. He possessed a commanding figure and much personal charm. In his best days he was a brilliant after-dinner speaker. Always eloquent, it was said of him that, if interested in his subject, he could make people believe black was white.

"Through force of genius and industry he amassed a large fortune, that later, when disease overtook him, was dispersed in various hazardous speculations.

"He was unmarried. Of a family originally large, only a sister and brother survive him."

Dr. Dwinelle's work has been an intimate part of the history of dentistry for the past fifty years. The journals teem with his original ideas, and he was an authority upon all matters of practice during almost that entire period. The results of his labor, while original, were generally of that fugitive character not unusual with original minds, that it would require a prolonged research throughout the literature of the profession to give anything approaching a detailed account of it.

He was honored in his day and generation, and never failed to receive close and deferential attention whenever in later years he presented himself before the American Dental Association. Few of those present will fail to remember the scene before that body on one occasion, when Dr. Dwinelle stood upon his feet to discuss a matter before it, and was called to order by a member on parliamentary grounds. The answer of that meeting, refusing to entertain that objection, was a generous response and a cordial recognition of the services he had rendered the profession.

Still later, when, broken in health, crushed by circumstances that had financially wrecked him, he retired to the old homestead to pass the remainder of his life, it was stated in that same Association that Dr. Dwinelle needed help, who can forget the immediate and generous response? And it now remains for those who contributed to make Dr. Dwinelle's last days comfortable to feel that not only did they perform a gracious act, but they have laid up for themselves treasures that will count for something in the great summing up of good deeds.

Dr. Bryson has alluded to his charming conversational powers. Those who had the pleasure of meeting him in social intercourse can testify to the truth of this statement. His mind was stored with the products of the best literature of the past and present time, and, with a tenacious memory, he could bring treasures from this storehouse to brilliantly illuminate an hour's converse or an after-dinner address.

He was almost the last of that brilliant coterie of men who made dentistry. This may seem a strong assertion, in view of all that has been accomplished in later years, but in any work it is always the original efforts that direct the course of the future. It was fortunate that dentistry at a critical period secured the devoted services of men of learning, both in this country and abroad, —men capable of infusing the true educational spirit into those who were to succeed them.

We thus leave Dr. Dwinelle, the generous friend, an original worker, a brilliant companion, and a true professional colleague; for one by one the funereal bell is tolling the requiem of departed worth, and as the mourners' train passes on, let us who remain gather up the treasures these have left, that nothing be lost.

Current News.

NORTHEASTERN DENTAL ASSOCIATION.

At the Union Meeting of the Connecticut Valley and New England Dental Societies, held October, 1895, in Worcester, Massachusetts, the question of consolidation was an important one.

Committees from the two societies had been appointed the year

previous looking towards that result. These committees made a favorable report, and presented a constitution and by-laws. Each society voted in favor of consolidation, and united in adopting the new constitution and by-laws, thus forming a new society of upward of two hundred and fifty members, under the name of the "Northeastern Dental Association." The following were the officers elected for the ensuing year:

President, Dr. James McManus, Hartford, Conn.; First Vice-President, Dr. James H. Daly, Boston, Mass.; Second Vice-President, Dr. C. C. Barker, Meriden, Conn.; Secretary, Dr. Edgar O. Kinsman, Cambridge, Mass.; Assistant Secretary, Dr. A. J. Cutting, Southington, Conn.; Treasurer, Dr. George A. Young, Concord, N. H.; Editor, Dr. C. W. Strang, Bridgeport, Conn.; Librarian, Dr. George F. Cheney, St. Johnsbury, Vt.

The Executive Committee and Section Committee are appointed by the president, who selected the following:

Executive Committee.—Dr. George A. Maxfield, chairman, Holyoke, Mass.; Dr. George L. Parmele, Hartford, Conn.; Dr. George F. Cheney, St. Johnsbury, Vt.; Dr. W. R. Blackstone, Manchester, N. H.; Dr. S. G. Stevens, Boston, Mass.

Section Committee.—Section I., Dr. C. T. Stockwell, Springfield, Mass.; Section II., Dr. C. A. Brackett, Newport, R. I.; Section III., Dr. William Jarvis, Claremont, N. H.; Section IV., Dr. Thomas Fillebrown, Boston, Mass.; Section V., Dr. E. S. Gaylord, New Haven, Conn.

The new society starts out harmoniously, and promises to be an important factor in dental circles in New England, and will doubtless shed its influence into the surrounding States.

Edgar O. Kinsman,
Secretary.

WOMAN'S DENTAL ASSOCIATION.

The Fourth Annual Meeting was held at the office of Dr. Mary H. Stilwell, 1718 Walnut Street, March 7, 1896. President, Dr. Anna T. Focht, in the chair.

Election of officers resulted in the following:

President, Dr. Elizabeth Davis; Vice-President, Dr. Maria T. Lasser; Recording Secretary, Dr. Hannah M. Miller; Corresponding Secretary, Dr. Bertha Jarrett; Treasurer, Dr. Emily W. Wyeth.

Executive Committee.—Drs. Eliza Yerkes, Anna L. Leaming, Emily W. Wyeth, Martha B. Corkhill, and Mary H. Stilwell.

Vice-Presidents for the various States represented are: Massachusetts, Dr. Mary Gallup; Rhode Island, Dr. Jennie H. Gallup; New York, Dr. Alice I. Ireland; Maryland, Dr. Fannie E. Hoopes; District of Columbia, Dr. Edith Jewell; Illinois, Dr. Hester Baker; Missouri, Dr. Alice A. Graham; Nebraska, Dr. Cora G. Little; Wyoming, Dr. Sarah Gardiner; Colorado, Dr. Sara May Townsend.

Present membership, thirty-two.

EMILY W. WYETH,
Recording Secretary.

3920 FAIRMOUNT AVENUE, PHILADELPHIA.

HARVARD ODONTOLOGICAL SOCIETY.

AT the annual meeting of the above society the following officers were elected:

President, Waldo E. Boardman, D.M.D.; Recording Secretary, Jos. T. Paul, D.M.D.

The treasurer, editor, and corresponding secretary were re-elected.

Executive Committee.—Jos. T. Paul, D.M.D.; Frank T. Taylor, D.M.D.; William P. Cooke, D.M.D.

Committee on Clinics.—J. G. W. Wemer, D.M.D.; William P. Cooke, D.M.D.; Arthur H. Stoddard, D.M.D.

Respectfully yours,
E. B. HITCHCOCK,
Corresponding Secretary.

THE

International Dental Journal.

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Original Communications.[1]

DENTAL AND FACIAL EVIDENCES OF CONSTITUTIONAL DEFECT.[2]

BY EUGENE S. TALBOT,[3] M.D., D.D.S., CHICAGO, ILL.

Every observant practitioner has noted the contrasted temperaments of his patients, their varying mental and physical characteristics, their differing resistance to pain and disease, and their response to treatment. Certain cases occur to every dentist in which local states do not explain the facts. In the same family it has been noticed that while with one child eruption of the teeth is marked by no extraneous morbid phenomena, in another convulsions and, perchance, death result. In adults tooth-extraction has been noted to cause fatal hemorrhage, and in children gum-lancing has had the same effect. Enamel and dentine discolorations, varying from whitish brown to black, occur without local cause. Teeth normally developed display erosions and abrasions in places where friction from occlusion is impossible. This is especially noted in ataxics, paretic dements, and victims of constitutional dyscrasia.

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the American Academy of Dental Science, Boston, February, 1896.

[3] Fellow of the Chicago Academy of Medicine.

Lipomatosis, or morbid corpulency, an expression of the gouty diathesis in children, for example, is often attended by jaw and tooth deformities, irritability, suspiciousness, capriciousness, and lack of will-power. The degenerate classes (congenital blind, congenital deaf-mute, epileptics, neuropaths, one-sided geniuses, hysterics, lunatics, paupers, prostitutes, criminals, etc.) are more susceptible to disease and have greater mortality than normal persons. The principle underlying this fact was recognized by Hippocrates twenty centuries ago, who also pointed out that even normal persons react differently to disease. In one the disease expends itself in pyorrhœa, in another gout of the great toe, in a third it appears as catarrh, in a fourth as biliousness, and in a fifth as mental depression. These constitutional variations may reveal themselves in local expression, as in supernumerary and deficient tubercles and teeth, variations in jaw size, in septum deflection, in turbinated bone, and in mucous membrane hypertrophy, with resultant adenoid vegetation.

Miller, of Berlin, deserves all possible honor for his clear demonstration of tooth decay in its primary etiology. It is a trite but somewhat defective truism that to know the cause is to know the remedy. The truism is defective in not recognizing any but an immediate cause. Behind this last, operate the more important remote or predisposing factors. The germ must have its culture medium. The immediate cause alone does not explain tooth-decay in constitutional disease in pregnant women, in school overstrain, and in the climacteric period between forty and fifty years of age in both sexes, etc. In those states oral antisepsis, hygiene, and prosthesis alone fails. Recent researches anent acromegaly certainly demonstrate that constitutional factors underlie tooth and bone-growth, and give a logical developmental explanation for what many dentists have clinically found to be a fact. While constitutional physical expressions of defect are often recognized at birth, the mental are not observed until later in life. Various tests are laid down for determination of deficiencies. Lombroso and Dana lay down the very broad rule that children who differ from their parents are of necessity degenerate. This claim is entirely too sweeping. The parents are the expression of many generations. A child may be perfectly healthy, yet present all the characteristics of grandparents; in other words, be an atavism, or "throw back." The mental state of the mother during pregnancy must be accepted as a factor, despite its denial by a few belated followers of Weissman, who himself has lately admitted maternal nutrition as an

influence in variation. This factor explains the birth of several healthy children followed by the birth of a degenerate with a club-foot, cleft spine, etc. Again, children who resemble either one or the other parent are not infrequently degenerates. A dietetic fad for pregnant women propagated by a Hahnemanniac, now a faith-healer, produced what some mothers called "fruit diet" babies,—irritable, feeble defectives, in marked contrast with previous children. The women pregnant during the siege of Paris found the child born thereafter so uniformly defective that, among the middle and working classes, "child of the siege" was a synonyme for "doomed child." These children had enlarged thyroids, cleft palates, cleft spines, irregularities of the jaws, teeth, ears, and eyes, as well as decided susceptibility to nervous and other constitutional diseases.

The farmer who desires certain results not only looks after his seed, but the soil in which it is placed. There has long been a dental bias to regard the seed (the local manifestation) as the only thing of importance, while the soil (the constitution) can be safely disregarded. There is, however, a growing tendency among all specialists to examine into the state of the body as a whole. The eye surgeon takes into account gouty and rheumatic states, not to speak of born defects. The gynæcologist does the same. The surgeon looks cautiously into the general health before performing grave operations. The dentist, warned by his encounters with the bleeder diathesis, is beginning to do the same. Underlying many of these constitutional states which are the sources of such dangers, noticeably the "bleeders," is the condition known as degeneracy. The term of late has become popularized, and therefore needs definition. A degenerate, scientifically, is a person whose brain and nervous system is unstable from inherited or acquired taint in the parents, who has in consequence undergone imperfectly the embryologic changes to a higher type in tissues or organs, and therefore exhibits tendencies liable to extinguish the race, as a type, under the usual conditions of the struggle for existence. While the majority of alienists, embryologists, and teratologists have recognized this state for decades, the science of the subject was first formulated half a century ago by Morel, of France, and has since been carried to its greatest and, it must be admitted, rather unjustifiable extreme by Lombroso of Turin and his followers. To Lombroso's industry in collection of facts the world owes a debt which outweighs any evil resultant on his rather rash generalizations. The degenerate, according to Morel,

exhibits various physical abnormalities which were supposed to be marks of heredity, and to which he gave the name "stigmata," or signs of degeneracy. The bones are, as to growth and development, most completely under the control of the nervous system. An osseous system normally developed usually denotes (other things being equal) a good physique. When the parts are not in harmony, "stigmata" of degeneracy appear. The stigmata of other systems are not so easily detected.

Lombroso claims that these stigmata so mark the degenerates, as a class, that, while they depart widely from the parental race type, they so approximate each other as to constitute a type, "the degenerate," which is a constant variety. While there is a certain truth in this, still the position of Lombroso is too absolute, since stigmata occur in normal persons as expressions of factors outside the field of degeneracy.

Stigmata of degeneracy may be confined to either the nervous or general system, while the other may not be materially affected. A congenital deaf-mute may be of fairly developed physique, while badly deformed individuals may have normally developed brains. In more marked degenerates (idiots, epileptics, prostitutes, and periodical drunkards) every part of the body may be more or less affected. These data are of special importance as clearing the ground for proper discussion of facts.

The higher and older the civilization the greater the evident degeneracy. In European countries more stigmata are observed than in this country; in New England more than in the West. More stigmata occur among the nobility of Europe than among the general population; the same is true of the American "society" class.

More investigations have been made and more has been written upon this subject of degeneracy by the French, Italians, Scandinavians, Germans, and Americans than by the English. Nothing appears in dental literature on this subject except so far as the dental arches are concerned. With this relationship dentists are chiefly concerned, and, the ground having been cleared, it is here fitting to discuss from a dental stand-point the various lesions of the oral cavity in their relation to systemic conditions. The following table by Moreau,[1] the alienist, outlines the classification of conditions more clearly than anything that has come under observation.

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[1] Morbid Psychology.

TABLE A.

NERVOUS AND HEREDITARY CONDITIONS OF IDIOSYNCRASIES.

Exceptional intelligence	Science.	
	Arts.	Music.
		Painting.
	Letters.	
Lesions of the nerve-centres.	Brain.	Paretic dementia.
		Paralyses.
		Tumors.
		Brain softening.
		Congestion.
	Spinal cord.	Softening of spinal cord.
		Myelitis.
Neurosis	Epilepsy.	
	Chorea.	
	Stammering.	
	Convulsive fits.	
	Hysteria.	
Intellectual	Utopians.	
	Eccentrics.	
	Mixed conditions.	
Emotional states	Prostitutes.	
	Criminals.	
	Unstable.	
Neuralgia	External.	
	Internal.	
Psychoses	Acute insanity.	Symptomatical.
		Idiopathic.
		Alcoholic.
	Imbecility.	
	Idiocy.	
	Chronic insanity.	General insanity.
		Dementia
		Partial insanity.
Special and general conditions of the senses		Congenital blindness.
		Anæsthesiæ.
		Deafness.
		Hyperæsthesiæ.
Rachitis.		

For the purpose of comparison, I present from my own work[1] a table prepared from a dental stand-point independently thirty years after Moreau. There is a close similarity; the differences are only such as must occur in the course of three decades.

[1] Etiology of the Osseous Deformities of the Head, Face, Jaws, and Teeth.

TABLE B.

Cerebral	Ethical degeneracy.	Crime.
		Prostitution and sexual degeneracy.
		Moral insanity, pauperism, and inebriety.
	Intellectual degeneracy.	Intellectual degeneracy.
		Paranoia.
		Adolescent insanity.
		Periodical insanity.
		Hysteria.
		Epilepsy.
		Neurotics.
		Genius.
		Idiocy.
	Sensory degeneracy.	Deaf muteism.
		Congenital blindness.
	Nutritive degeneracy.	Lymphoid degeneracy.
		Tissue instability.
		Plural births.
		Bleeders.
		Excessive fecundity.
		Gout.
Spinal	Various congenital and hereditary disorders.	
Local reversional tendencies.	Jaws.	
	Cleft palate.	
	Teeth.	
	Primitive uteri	and allied male states.
	Cloacal conditions	and allied male states.
	Horseshoe kidney and allied states.	
	Cyclopean monstrosities.	
	Ameliacs and polymeliacs, club-feet, etc.	
	Plural mammæ.	
	Simian muscular and bony states.	
	Liver, and other organ reversions.	

As the functions of the nervous system are not merely to govern motion and sensation, but to control nutrition, defects of the nervous system in this latter particular may produce acromegaly or other excessive and arrested developments of tissue. This may influence the body as a whole, producing a "Tom Thumb" or a Chestnut Street, Philadelphia, policeman, or may affect parts only, as the face from the lower border of the orbits down, including masticating surfaces of the upper molar teeth. The upper part of the body as far down as the pelvis may be normally developed,

while the lower limbs and feet (frequently seen in club-feet) are undeveloped.

From this factor in nervous functions results the osseous expression of degeneracy in the defective classes, which expression, as will appear on analysis of the different classes, varies greatly. The prostitute, according to the researches of Pauline Tarnowsky, Sollièr, Lombroso, and myself, present the most decided stigmata of all classes of degenerates. In them intrinsic rather than extrinsic causes play a large part. Even professional thieves are less decidedly a type of defectives. Their ancestry reveals a great proportion of syphilitics, alcoholics, sexual or other criminals, hysterics, and neuropaths.

Dr. Tarnowsky's researches show the professional prostitute to be a degenerate being, who is a subject of an arrest of development, tainted with a morbid heredity, and presenting stigmata of physical and mental degeneracy fully in consonance with her imperfect evolution. The degeneracy due to an imperfect organization in prostitutes principally appears in the frequency of skull deformities (forty-four and one-third per cent.) and deformities of the face (forty-two and two-thirds per cent.); by numerous anomalies of the ears (forty-two per cent.), and of the teeth (fifty-four per cent.).

The mental stigmata appear as a more or less marked intellectual feebleness, in a neuropathic condition, in a notable absence of moral sense.

Lombroso, on examination of fifty prostitutes, found exaggerated lower jaws twenty-six times, plagiocephalia twenty-three times, asymmetrical noses eight times, prominent zygomæ forty times.

In order to determine if such conditions existed in this country, I made, together with Dr. Harriet C. B. Alexander and Dr. J. G. Kiernan, some researches in the Chicago Bridewell. The inmates here are the least intelligent of any of the class. The researches are necessarily far from complete, owing to the difficulties under which such researches must be made in cases of persons with short-term sentences. They were, however, habitual cases, some being in the institution from time to time for twenty years, and most of them criminals. The number examined was thirty. All showed marked stigmata.

V-shaped dental arches	10
Partially V-shaped dental arches	17
Semi-V-shaped dental arches	7

Saddle-shaped arches	27
Partially saddle-shaped arches	10
Semi-saddle-shaped arches	10

The jaws in some cases were so badly deformed that frequently two deformities would be upon the same jaw.

High and deformed zygomæ	16
Deformities of the face	14
Arrest of lower jaw	1
Arrest of bones of face	4
Abnormal noses	6

The teeth were all irregular and badly decayed: sixteen showed discoloration of the enamel; nine, wearing away of enamel. Supernumerary tubercles were numerous, and eight were minus third molars in the upper jaw, and six in both jaws.

Hypertrophy of the jaw and alveolar process was common, and all had more or less tartar upon the teeth.

My object in dwelling upon this class of degenerates will be shown later on. Much more could be said on this subject, but enough stigmata has been demonstrated to show that this class is very low in the scale of human evolution.

For the purpose of comparison I present the findings of one particular variety in the other defective classes.

TOTAL DEFORMITIES IN THE JAWS OF IDIOTS.

No.	. .	Normal.	Large jaw.	Protrusion lower jaw.	Protrusion upper jaw.	High arch.	V-shaped arch.	Partial V-shaped arch.	Thumb-sucking.	Saddle-shaped arch.	Small teeth.
1977	. .	1095	152	92	159	318	129	236	31	207	71
Per cent.	.	55.3	7.6	4.6	7.9	16.	6.5	11.9	1.5	10.4	3.5

TOTAL DEFORMITIES IN THE JAWS OF THE DEAF AND DUMB.

No.	Sex.	Normal.	Large jaw.	Protrusion lower jaw.	Protrusion upper jaw.	High arch.	V-shaped arch.	Partial V-shaped arch.	Saddle-shaped arch.	Small teeth.
1111	Male.	538	197	41	116	241	91	115	108	51
824	Female.	363	108	51	89	177	78	77	95	62
1935	. .	901	305	92	205	418	169	192	203	113
Per cent.	.	45.3	15.7	4.7	10.5	21.7	8.7	9.9	10.4	5.8

Two cases cleft palate.

TOTAL DEFORMITIES IN THE JAWS OF THE BLIND.

No.	Sex.	Normal.	Large jaw.	Protrusion lower jaw.	Protrusion upper jaw.	High arch.	V-shaped arch.	Partial V-shaped arch.	Saddle-shaped arch.	Small teeth.
107	Male.	53	8	9	10	20	4	3	6	7
100	Female.	52	8	7	5	18	3	6	5	3
207	. .	105	16	16	15	38	7	9	11	10
Per cent.	.	50.7	7.7	7.7	7.2	18.3	3.3	4.3	5.3	4.8

One case cleft palate.

INSANE TAKEN AS A WHOLE.

No.	Sex.	Normal.	Large jaw.	Protrusion lower jaw.	Protrusion upper jaw.	High arch.	V-shaped arch.	Partial V-shaped arch.	Saddle-shaped arch.	Small teeth.
430	Male.	394	10	4	2	18	12	29	3	5
270	Female.	226	8	6	4	26	14	18	9	2
700		620	18	10	6	44	26	47	12	7

In one hundred professional men and expert mechanics, which come under the head of Geniuses, the following results were obtained:

DEFORMITIES OF THE JAW.

V-shape	12
Partial V	20
Semi-V	7
Saddle	21
Partial saddle	12
Semi-saddle	14
Marked deformities of the face	32

Other deformities of the head, ears, face, thyroid glands, etc., were very markedly developed among these degenerates.

From these tables it is observed that from sixty to ninety-five per cent. of at least one type of deformities occur among degenerates. As the ear varies enormously with the same class of persons, it is not surprising that, as Morel showed half a century ago, a demonstration which my own experience corroborates, the ear should be most frequently affected by degeneracy; next for the same reason come the jaws and teeth, and finally the head and face. Abnormal development of all is strong evidence of degeneracy. The data

given are, with the exception of the geniuses, from inmates of public institutions. These considered as degenerates are the extreme wrecks,—wrecked by bad inheritance, but wrecked also by surroundings. Furthermore, degeneracy may be evident only in the return to bird and reptile states of the lever which produce hereditary gout, etc. Here the otherwise normal individual will present stigmata of degeneracy, while his less fortunate brother will be one of the defectives. These classes of apparently normal persons are numerous. One neurotic child receives good school training and lives a long life with only perchance a tendency to gloomy views of life. This was the case with Schopenhauer, the German philosopher. Several other children are wrecked by bad parental or school training. Some, however, survive even this, and their defect is shown only in an undue tendency to superstitious belief. This was the case with the novelist George Eliot, as Dr. Harriet C. B. Alexander has shown; another may inherit or acquire an inactive liver, like the author. As the extreme cases, therefore, only reach public institutions, the amount of degeneracy encountered by the dentist cannot well be over-estimated, since he sees from the nature of stigmata a larger number of relatively normal degenerates than the physician. Degenerate ears do not come to the otologist, since their function is apt to be normally performed. Degenerate teeth and jaws do not perform their functions normally, or, if they do, they interfere with the comeliness of the patient. It is not exceeding the mark to claim that from fifty to seventy-five per cent. of the dentists' patients are degenerates; hence it is well to examine the lesions of the tissues of the mouth, bearing in mind the fact that all such cases possess a defective nervous system.

Acromegaly and arrested development of the face, jaws, and teeth are almost invariably associated with degeneracy, although many cases are due to heredity or maternal worry and innutrition; yet cleft palate and harelip are the noticeable defects at birth. In all of these cases, with the exception noted, the extent of the deformity is not noticed until between the ages of twelve and eighteen years. These develop with the second set of teeth, and the position of the jaws to each other are thus expressed. Arrest of the upper jaw means a V or saddle arch; arrest of the lower, a saddle arch or an undeveloped chin. Acromegaly of the jaws and alveolar process are frequently noticed. Enlargement of the body of the jaws, of only one, or of the alveolar process, upper or lower, may occur. If the excessive development commences early, with

the development of the second set of teeth (enlargement of the alveolar process is usually excited by the irritation of the erupting teeth), it will continue, and the teeth will be carried forward and laterally, causing space between. Frequently the enlarged alveolar process is only observed at the posterior part due to the eruption of third molars. In these conditions we frequently find small teeth when the germs and teeth are missing: they are invariably associated with a defective individual.

ACROMEGALY.

Acromegaly may affect the body as a whole or parts. At the Dunning Asylum is an idiot whose body is nearly normal, but whose head, hands, and feet are twice the normal size. The jaws are large in proportion. A German leader in an orchestra has a head and face excessively developed, jaws and teeth very large. A Hebrew, who died of phthisis, had a lower lip so excessively developed that when drawn up it completely covered his nose. He possessed a very small upper jaw with V-shaped arch; the lower jaw was prognathous. Teeth were badly decayed, and there was an excessively large quantity of tartar. Such cases are frequently seen among our asylum patients, and are not uncommon in our daily practice.

The report of the work in the clinics of the Breslau Royal University includes a case of dental deformity in akromegalia in a mill-worker, always in good health, and from a healthy family. After serving his time in the army, in 1877, he noticed an enlargement of his hands and face, which grew for about three years, and then ceased. The patient is short, stout, rather heavily moving, though strong and strikingly pale, especially the lips and eyes, and the face puffed. The speech is slow, the thoughts inactive. The lower part of the face is strongly developed and the lower jaw and the upper lip protrude, allowing the forehead and skull to retreat. The lower jaw measures fourteen centimetres from chin to jaw-angle, and carries strongly developed soft and spongy lower lip. Its thickness is two and a half centimetres. The lower jaw projects at least one inch over the upper one. The distance between the lower wisdom-teeth is 6.8 centimetres, their connecting line with the lower central incisors measuring 4.9 centimetres. The distance between the wisdom-teeth in the upper jaw is four centimetres, and on their connecting line with the central incisors 3.2 centimetres. The teeth are quite decayed; those of the lower jaw do not strike their opposites. The upper jaw is normal. Especially curious appears

the widening of the tongue; it is soft, its mucous membrane much wrinkled and folded; it is movable in all directions, though with some difficulty. The skin on the face is somewhat thick, faded, and weak. The facial bones show no softening. The neck is short and thick, but no swelling of the thyroid gland exists. The chest is well rounded, of normal volume.

SUSCEPTIBILITY TO PAIN.

Pain susceptibility is, all things considered, less in the lower than in the higher types, but dread of pain has greater effect in the lower than in the higher. While degenerates suffer less from pain than the higher types, they dread it more, hence the frequent dangers in dentistry among this class. The dread acts like a shock.

Corpulent children, people suffering from disease, neurotic individuals, due to nervous strain, are the classes most susceptible to pain in dental operations.

LIPOMATOSIS OR MORBID CORPULENCE IN CHILDREN.

Ebstein and other authorities have shown that obesity or excessive corpulence is an expression of the same trophic disorder as gout and rheumatism. Ere forty years, the period of involution especially, and ere puberty, such corpulence is attended by marked trophic change in the tissues of the body, whence the deficiencies already noted in fat children who readily fall victims to all sorts of microbic invasion, and whose cardiac and vasomotor state predisposes them to serious disorders.

DEGENERACY OF THE NERVOUS SYSTEM AFTER FORTY YEARS OF AGE.

The period of life between forty and sixty is to a man a period of involution when certain functions are ceasing to be active factors in the life of the individual. The structures devoted to retrograde metamorphosis assume predominance, and the arterial system shows a tendency to fatty change. This most often occurs between forty-five and sixty, but cases at forty are far from infrequent. In both sexes at this period, as at puberty, there is marked tendency to nervous disease. The changes, of what may well be called the climacteric, are the results of deficient power of supplying nutrition rather than excess in utilization; hence the primary changes of the arteries and their secondary consequence in the bones and teeth. Sudden marked changes in the teeth are very likely to take

place, such as abrasion, erosion, decay, and discoloration, which are noticed throughout this paper.

DEGENERACY OF THE NASAL CAVITY.

Hypertrophy of the bones of the nose, mucous membrane, adenoid vegetation, and catarrh are associated with stenosis of the nasal cavity, deflection of the septum, arrested development of the superior maxilla, including mouth-breathing, V-shaped arch, and premature ossification of the bones of the base of the skull. One is not caused by the other, but all are due to the same cause,—degeneracy. Such conditions can be recognized at a glance, from the undeveloped appearance of the face.

NYMPHOMANIA AND THE TEETH.

In every community exists a class of women, married and single, whose status in society would seem to indicate that their morals were of the best, but who in secret are demi-mondaines. Their characters are familiar among all classes. They present the same stigmata as those confined in public institutions. That prostitution is an inheritance is aptly illustrated in the history of Alphosine Plessis, idealized by Alexander Dumas in "Camille." Her paternal grandmother, who was a half prostitute, gave birth to a son by a country priest. This son was a peddler by trade. The maternal great-grandmother was a nymphomaniac, whose son married a woman of loose morals, by whom a daughter was born. This daughter married the peddler, and their child was Camille. She had undoubtedly the powerful perverted sexual instincts of her class. She died childless early in life from consumption. Children with this inherited taint, even if put into better surroundings, usually prefer debauchery when they grow up. Man is susceptible to many crimes, but woman diverges from the beaten path in the direction of the least resistance. These women, as a rule, possess fine features and are good looking. This is due, in many cases, to the fact that the bones of the face are arrested in development, the person retaining the childish features throughout life.

TEETHING, GUM-LANCING, AND EXTRACTION.

Nothing satisfactory has been written upon the subject of teething explanatory of the causes of the systemic disturbances so immediately associated with physiological dental evolution.

Eruption of the teeth is a natural process, and, like child-bearing, should be accomplished with very little pain. The ex-

perience of physicians and dentists, however, demonstrates a different state of things. Not only do children often suffer intensely while the teeth are erupting, but convulsions and even death may ensue.

J. W. White[1] says, "It is rare for a child to pass through the period of dentition without more or less manifestations of suffering, and frequently there are serious and alarming disturbances of the health."

Close observation has shown that in a family of ten children only one passed through the evolutionary stage of teething without constitutional disturbance. A family of six children (five girls and one boy), had most alarming symptoms during the period.

One of the oldest theories as to the cause is that the tooth or teeth pressing against the gums produces the pain, another that the backward pressure of the teeth upon the superior or inferior nerve is the cause.

White further says, "In estimating, therefore, the mischief which may result because of a lack of accordance between the eruption of a tooth and the absorption of the tissues which impede it, we may imagine the sensitive nerve—which, when exposed by decay, is so intolerant of contact even with the atmospheric air—held between the bony socket and the sharp edge of the incomplete root by the backward pressure of the resisting gums, thus giving rise to a true toothache, comparable only to that exquisite torture which is experienced in after-life from an exposed and irritated pulp." These, together with the undeveloped nervous system, are supposed to be the cause of the systemic disturbances. It would seem, however, that since the nervous system is undeveloped, there is less sensitiveness to pain, and although the immediate cause is the erupting tooth, other and far greater predisposing causes than have as yet been advanced must be looked for.

Dr. Harriet C. B. Alexander,[2] in a very able series of papers upon the subject of "Acute Mental Symptoms in Children," has shown that the brain and nervous system of children are frequently unbalanced; a lack of equilibrium manifested in manners and actions.

From observation, I am convinced that those children who suffer with complications in teething are the victims of an inherited or acquired neurotic constitution; while the advancing tooth or

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[1] The Mouth and Teeth.

[2] *Medical Standard*, April, May, June, 1893.

teeth is the exciting cause, the systemic complications are due to an unbalanced nervous system. On the other hand, a strong, healthy child, whose nervous system develops in harmony with the other tissues of the body, rarely suffers during teething. The children of the two families just mentioned were victims of inherited degeneracy. The proper thing to do in such cases is to assist the eruption immediately,—namely, lance the gum. This, however, is not infrequently followed by disastrous results,—excessive hemorrhage, and occasionally death, evidence of another type of degeneracy, the bleeder. Great care, therefore, should be exercised in ascertaining the general conditions of the child ere grave results appear.

In 1872[1] I was called to lance the gums of a puny, sickly, anæmic child. Although there was plenty of nourishment from the mother, the child did not flourish. I lanced the gums, but she died, despite all the family physician and myself could do to arrest hemorrhage.

The dentist not rarely comes in contact with bleeders in extracting teeth and removing tartar, and not infrequently death results. I have never had a death from extracting, but I have had very serious hemorrhages from cleaning and extraction; one case of which is here of interest. In 1870 a patient came to me to have his teeth put in order. As is customary, I first removed the tartar and cleaned his teeth, which I had some difficulty in doing because of hemorrhage of the gums. I was unable to do more at that sitting, owing to the excessive bleeding, so I dismissed him. At three o'clock the next morning I was sent for, and found the family physician had been all night trying to stop the hemorrhage. After five days and nights I finally controlled it. It probably stopped on account of the weak condition of the system. The patient, however, remained in bed two months in a very low state. I learned from his physician that he had had two hemorrhages of the urinary tract, presumably of the bladder, and that he was consumptive. When he recovered, his physician sent him to California, where I lost trace of him. It would seem to the average dentist, reading an account of a death from hemorrhage from extraction, that there must be carelessness or neglect on the part of

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[1] While each point herein made is illustrated with but from one to three cases in practice only, it could easily be supported by numerous others from the author's note-book.

the operator. I can assure you that the dentist who has a bleeder under treatment deserves the sympathy of his fellow-practitioners.

ABRASION, EROSION, AND DISCOLORATION OF THE TEETH.

In the "American System of Dentistry," Dr. Black, after discussing this subject in thirteen and a half pages, frankly admits that we know very little about it. The literature of this subject proves that he is correct. Much has been written, but nothing developed. By close observation, however, a little light may be thrown upon the subject. Abrasion of the teeth of the ancient Egyptians, Peruvians, Mound Builders, Cliff Dwellers, Indians, and all those people who live upon coarse food is one thing, and that observed in civilized races to-day is another. Both are the result of friction, but one is a physiological process, the other pathological. One is a gradual wearing away of the teeth of strong, healthy, robust persons in their struggle for existence, the other is the result of tooth-softening due to a degenerate nervous system. People exist to-day, however, whose teeth wear away like the ancients.

Certain able dentists claim that abraded teeth are harder and more dense than ordinary teeth; my observations show that they are much softer, and that they cut easier than normal teeth.

Abrasion and erosion of the teeth commence more frequently after the fortieth year than at any other time. Occasionally, however, they are connected with the first set of teeth and at different periods through life. Sometimes they are spontaneous and make their appearance almost immediately after illness, after severe mental strain, grief, or at any period in neurotic children. In connection with abrasion and erosion due to pathological conditions there is almost invariably present discoloration of the enamel and dentine. Occasionally erosion and abrasion appear without discoloration and *vice versa.*

Discolorations appear frequently early in life upon the first and second teeth after severe illness, and frequently appear in life after the fortieth year. The discolorations are often seen in small spots upon one tooth, confined entirely to one tooth, or all the teeth on both jaws will become involved. Erosion will affect the whole surface of one tooth, or only in spots, in one or in all the teeth. The surface is usually polished and apparently hard, while underneath, the enamel and dentine are soft. The tooth is less sensitive and the pulps have receded. Whenever discoloration is observed, the tooth is always softened; the discolored part is unusually so when all or nearly all the teeth are involved. The enamel can be

removed from the dentine with ease, and the dentine can be cut like horn without pain. Oftentimes the crowns will be partially or entirely worn away. There is usually no sensitiveness in the dentine, the pulps have receded, and the pulp-chamber is filled with uncalcified dentine. Cases of this nature illustrated in the "American System of Dentistry" (pages 415 and 416, figs. 106 and 107) by Dr. Barrett, of Buffalo, N. Y.

Dr. D. B. Freeman, of Chicago, has remarks of a similar case cited in the "American System of Dentistry:"

"The patient was a medical student, twenty-six years of age. The enamel was totally lacking on all of his teeth except the second and third molars, and even there it was deficient and imperfect in places. All the crowns were very much worn, those anterior to the molars being level with the gum line. They were not then, nor had they been, sensitive. He could not remember when they were in any other condition or in appearance different from that when they were presented. He said his ancestors for three generations, on his father's side, had this peculiar deficiency of crown structure, and his three brothers and two sisters presented this same condition."

I have had seven similar cases. The abrasion, however, was not quite so extensive in any of them. One case deserves mention: Mrs. A., an American, is a born degenerate, small in stature, small long bones, small head, face, and jaws. Her first teeth were soft, decayed early, and were lost before the time for the eruption of permanent teeth, which teeth came in in fairly good shape, although a few small fillings had to be inserted. She married at twenty. A still-born child was the result of a two years' marriage. At this time her teeth began to soften; although her appetite is good, she is tired all the time, and her nervous system has become depressed. Her teeth were all filled in good shape at the time of her marriage. The enamel softened and disintegrated, leaving the fillings standing attached to the dentine. The enamel can be removed in large pieces from the dentine, showing that there is but little attachment. The enamel is like chalk and can be removed readily. The dentine in places where exposed is but slightly sensitive. It is discolored and can be ground down like horn. The bicuspids and molars, upper and lower, are affected. The incisors and cuspids, while they have not disintegrated, have grown quite dark and are soft like the other teeth. There is no decay, though the teeth have soft spots in places. This wearing away is upon the grinding surfaces, although in most places friction does not come in contact

with them. A similar case is cited in my work,[1]—Case VII., Fig. 60, p. 240.

In my asylum investigations for the past twenty years, I have not failed to note the peculiar condition of the teeth in certain neuroses, particularly paretic dements and spinal lesions such as cord injuries and locomotor ataxia. I have had eighteen ataxic patients in my private dental practice. Three hundred and thirty-two dements all showed more or less abrasion. Forty-seven ataxic patients all showed abrasion. Post-mortem examination reveals tissue-change of the nerve-structure and also of the arteries. The trophic centres become disordered and body nutrition is impaired. Not only are the nails, hair, and skin affected, but the teeth soften and are worn away.

In most ataxic patients and many dements, marked cupping out of the crowns is observed. In other forms of insanity we find a large percentage of abrasion as in cases due to syphilis and other diathetic states.

In Egyptians, Peruvians, Mound Builders, Cliff Dwellers, and a few of our people whose central incisors do not lap but meet squarely, the motion of the jaws in mastication is quite different from those whose incisors lap. Abrasion takes place from the rotary motion of the jaws, "mill-like"; not only are the cusps ground off smooth, but the teeth are gradually worn away until the gums are reached. I have observed this condition in the first set of teeth. When this condition takes place, the dentine about the pulp-chamber and the secondary dentine is invariably discolored; we do not find erosion in this class of patients, nor do we find it to any extent in asylum cases.

In the pathological cases, however, they are quite marked. It seems to be associated with our modern style of living and habits,—that is, first softening, and then friction. Mental strain, disorder of the arterial and nervous systems from diseases, and a general change in the system are the most frequent causes of abrasion, erosion, and discoloration of the teeth after forty years of age.

Two cases are of interest and identical: Mr. D., sixty-four years of age, Mr. M., sixty years, both lawyers of good standing, both patients for twenty-one years. The teeth of both gentlemen were strong and well developed, and required very little attention, except the removal of tartar, until about ten years ago, when they began to soften and decay; within the last three years it was with

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[1] Etiology of Osseous Deformities of the Head, Face, Jaws, and Teeth.

difficulty that I was able to preserve them. Mr. D. died suddenly, September, 1892, from aneurism of the aorta. Mr. M. died September, 1895, of the same lesions. Post-mortem revealed atheroma of the arteries, which had been going on for some time. The year before Mr. M. died the teeth cut like soft cheese and decay went on continually. Although I had taken excellent care of his teeth, I filled twenty-three cavities two months before death. Abrasion of the teeth commenced when the gentlemen were about fifty years of age, and had gone on to a great extent at the time of death. It will be observed that I make no distinction except locality and color in the three conditions, abrasion, erosion, and discoloration of the teeth, all being the result of disorder of the nervous system.

We do not have to go far to corroborate the views herein expressed, that these lesions are due to trophic changes.

ABRASION, EROSION, AND DISCOLORATION.

The bone changes so prominent a trophic feature in locomotor ataxia were necessarily, as Duchenne de Boulogne pointed out two decades ago, accompanied by changes in the teeth. At the meeting of the French Association for the Advancement of Science, August 30, M. T. David read a paper upon lesions of the teeth in locomotor ataxia, based upon the analysis of a single case. The most important of the conclusions arrived at were: The alterations consisted of a rapid decay of the anterior part of the crown of almost all of the teeth. The altered substances assumed the consistence of touch-wood of a reddish color. The enamel still retained its polish but not its hardness. Beneath those parts of the pulp had been produced a new layer of secondary dentine, and in most of the front teeth the pulp-cavity was filled up. These alterations had nothing in common with caries, and must be referred to nutritive disturbance resulting from the lesion of the central nervous system. The changes are analogous to those which have already been observed in the nails in locomotor ataxia. They then establish a pathological relationship between organs already connected by a common epithelial origin. Locally these alterations recognize for their immediate cause a functional disturbance or a lesion of the dental pulp. The atrophy shown to exist would be quite comparable to that observed in the eye under similar circumstances. What is true of locomotor ataxia is true of its closely allied nervous disease, paretic dementia, or paresis.

In sixteen ataxic patients under my care for dental services, all

possessed marked abrasion with considerable cupping. Out of twenty-nine cases of locomotor ataxia in our public institutions, twenty-eight had marked abrasion, and one was not sufficiently advanced to call it a decided case. The physician in charge was not quite certain of his diagnosis.

I have observed three cases: One, a Pole twenty-six years of age, had good sound teeth until his back was broken. When I saw him, eighteen months after, all of his teeth showed marked abrasion and cupping. Another, an Austrian forty-five years of age, had his back also broken. Both men were paralyzed in the lower limbs. The latter also showed marked abrasion. A very interesting case is that of Lee Soy, a Chinaman. He has lived in America twenty-seven years, and has had locomotor ataxia eight years, the result of syphilis. Abrasion presents itself on all the teeth. The molars and bicuspids are cupped out.

Dr. Edward F. Keefe, of Chicago, who has quite a large practice among Hebrews, has a large number of patients suffering from erosion. Although he is preparing a paper upon this subject, he has kindly allowed me the use of some of his cases for this paper.

Mr. E., forty-six years of age, of nervous temperament, suffered with indigestion. All the anterior teeth, upper and lower, badly affected; had had this condition seven years and seven months.

Mr. S., forty-five years of age, health good; six years ago had nervous prostration. At this time the erosion took place. Is now in good condition. The erosion has stopped.

Mr. H., forty years of age; nervous temperament. Can't remember when erosion began; has just noticed it.

Mr. S., forty-six years of age. Duration, five years. No history. Upper left incisor and cuspid.

Mr. M., thirty-three years of age. Duration, one year. Nervous temperament. Upper right and left bicuspids and one molar.

Mr. B., forty-one years of age. Duration, two years. Nervous temperament. Upper and lower incisors and bicuspids.

Mr. M. No history; sixty-five years of age. Upper incisors and right cuspid.

Mr. K., sixty years of age. No history. Lower left incisor and cuspid. Disease ceased.

Mr. G., thirty-nine years of age. Duration, four years. Upper centrals, left lateral, left lower second cuspid.

Mr. D., forty-five years of age. Nervous temperament. Duration, five years. Upper and lower incisors. No history.

Mr. M., sixty-five years; sick twenty years.

Mr. P., aged forty-five years. Nervous temperament. Duration, five years. Upper right bicuspid, left upper bicuspid, lower left cuspid and first and second bicuspid.

I record these cases just as they were given to me on examination tablets, with the teeth marked showing erosion. Since this class of individuals are rich in the inheritance of all the ills that flesh is heir to, and since nervous disorders are very common among these people, they furnish a rich field for the study of erosion, abrasion, and discoloration. If it were possible to study each case, we should, no doubt, find that all had some trophic change at the commencement of this lesion. In three hundred and forty-three paretic dements and general paralytics, every patient showed abrasion to a more or less marked degree. This is to be expected, since there is a similarity in the nature of the disease.

Abrasion or erosion in a number of cases has been shown to progress rapidly and then cease altogether, or it will progress slowly and continue through life. Abrasion and erosion are frequently observed in the same mouth and on the same teeth.

DECAY OF THE TEETH.

Admitting that the immediate cause of decay of the teeth is micro-organisms which must always have the same food to thrive upon, regardless of surroundings (since dentists are unable to effect a permanent cure by simply filling the cavity), other causes far more reaching in these destructive elements than those already laid down in text-books must be looked for. Clinical history and observation can accomplish a great deal in this direction. First, in regard to the general formation of enamel and dentine.

Text-books, in a gingerly fashion, allude to a predisposing cause, that of heredity in producing faulty formation of the teeth. In my opinion, acquired causes like worry, starvation, and fright of the mother, starvation, and improper assimilation of food after birth produce more stigmata than any one cause. Two factors enter into the cause of degeneracy: first, heredity; secondly, disorder of the trophic centres, due to local causes. These are the predisposing causes of faulty tooth-development, producing pits, furrows, and interglobular spaces.

Patients, no matter at what age, when attacked by a constitutional disease, suffer from decay to a greater extent than at any other time. The teeth of pregnant women decay more at that

period than at any other time, and not infrequently a tooth, or even all the teeth, will be lost in six months to one or two years. This happens when complications arise. Fill the teeth of a young man or woman, and after a year at college or boarding-school, in many cases they return with cavities in nearly every tooth. These conditions are familiar to every practitioner, and illustrations are not necessary. Foreigners, such as Swedes, Norwegians, etc., coming to this country, experience such a change in climate and food that they take on the constitutional diseases and various stages of insanity much more readily than in their native land. The teeth decay much more rapidly than in any other class of individuals. These changes can be accounted for only by change that takes place in the trophic centres.

People over forty years of age not infrequently have decay attack their teeth, and it will be as impossible to protect them from decay as it is to protect the first teeth of a neurotic child. The two cases, those of Mr. D. and Mr. M., already alluded to are good examples of decay of the teeth from physical degeneracy. One case, due to overwork, will not be out of place here: Mrs. J., married, forty-eight years of age, a professor in Women's Medical College, Chicago, had, until three years ago, a very fine set of teeth. She is a large, healthy, well-developed woman. Overwork at the World's Fair and her college duties caused rapid decay of the teeth to the extent that she nearly lost the left lateral incisor. It was a question whether to build it out with cement or adapt an artificial crown. By taking a trip abroad and treatment, she has recovered her strength, and the mouth and teeth are in a much healthier condition.

The effect is, that the assimilation powers are lost, and as a result, the developing tissues are improperly formed, and if fully developed they degenerate. It can, therefore, be readily understood how, at any time in life, whether from inherited or acquired taint, constitutional disease, or overstrain from mental work, trophic changes in the nervous system will produce changes in tooth-structure. If the food products which sustain the micro-organisms be present, decay will take place in proportion to the power of resistance of the tooth on the one hand and the quality and quantity of the germs on the other. Decay of the teeth takes place in degenerates more readily and rapidly than in healthy individuals. This fact is easily demonstrated by examining the mouth of those confined in asylums. This is especially true of professional prostitutes. Dentists need not go out of their offices to demonstrate

the fact. In classifying patients, the difference can be readily seen.

Trophic changes due to constitutional disease as illustrated by so-called Hutchinson teeth, pits and furrows upon the enamel, and malformation of teeth, are familiar to every dentist. Spontaneous death of the pulp, from fillings and other causes, which so frequently occurs in some mouths, is always observed in the mouths of degenerates.

Teeth decay more readily in the mouths of those whose jaws are arrested in their development than in others, a marked illustration of the power of degeneracy.

Softening of the teeth, abrasion, erosion, and discoloration, even to the extent of the crowns being entirely worn down without decay, may occur, the culture medium for micro-organisms not being present. Trophic disorders themselves furnish pabulum for micro-organisms.

In order to show how degeneracy will occur in families, I herewith present the histories of three families, citing such stigmata of degeneracy only as are of interest to us practitioners of dentistry.

Case I.—An American professional man married a Welsh woman. Both have marked facial stigmata. The man's jaws are arrested in development. The alveolar processes are undeveloped, bringing the jaws close together. The teeth are irregular, and (at the age of fifty-three) are loose on account of deposit of calcic salts. The upper jaws of the wife are small. The teeth are irregular. There is partial saddle-arch. At the age of forty-eight she had lost several teeth from decay and calcic deposits. Her ancestral history had a strong degenerate (insane) taint.

Six children were the offspring of the marriage. The oldest (a twenty-year-old girl) is of a nervous temperament, and short in stature. She has arrest of the facial bones and decided prognathism of the upper and lower jaw. The teeth are small. There are large spaces between the incisors, bicuspids, and molars. The upper and lower cuspids are undeveloped,—evidently from the density of the alveolar process,—although they are in position in the jaws, with plenty of room.

An eighteen-year-old girl, the second child, has still more decided stigmata. There is a full forehead, long slender nose, arrest of upper and lower jaw, partial V-shaped arch. The teeth are regular, but badly decayed. There is a large thyroid gland. The patient is a tall, slim girl, with long, slender small bones, dry skin

and is poorly nourished. She is without principle or stability, and easily led. She became pregnant through (it was ascertained by her parents) some one of six boys who had been intimate with her. A young man married her on payment of a large sum, assumed the paternity of the child, and moved to a distant part of the country.

The third child is a sixteen-year-old boy.

Arrest of development of the entire body, rachitic, arrest of the bones of the face, jaws small, teeth soft, chalky, and badly decayed.

The fourth child (a fifteen-year-old girl) is phthisical, and has a spinal lesion. She is slender; she is unable to go to school on account of her irritability. She cries on very slight provocation and sleeps poorly. The jaws are small. There is arrest of the anterior upper and lower jaw. The left inferior second biscupid is undeveloped. There is a saddle-shaped arch. The temporary superior cuspids are in place. There are no signs of the permanent teeth. There is much tartar on upper and lower jaws. The gums are puffy and hemorrhagic. There is seeming sensibility to sudden unexpected pain.

The fifth child (a ten-year-old girl) is of nervous temperament and somewhat precocious. The forehead is very prominent. The vault is high, with long development of the median suture. Most temporary teeth are in place, but badly decayed. The first permanent molars have large crown fillers, and there are yellow-gray patches on these teeth.

The sixth child (seven years old) does not yet display any stigmata. The jaws are so developed that the incisors strike square, and abrasion is quite marked upon the first teeth. The cuspids and temporary first molars are also worn away perceptibly. The lower permanent first molars are in place. Their enamel is discolored. There is no appearance of upper first molars. The child (a boy) has an unusually large head and jaws for his age, evincing acromegalic indications. The probabilities are that he will be marked by prognathism. There is a marked ridge of the median line of the roof of the mouth.

Case II.—Three years ago a sixty-four-year-old American died. After his death he proved poor, in lieu of being wealthy, and was buried by his friends. He had indulged his family in expensive tastes. He had a rather high, dolicephalic head. Eyes small and set close together; long aquiline nose, long Morel ears, with Darwin tubercles; high cheek-bones; small upper jaw, V-shaped arch; long slim lower jaw; arrest of the alveolar process; teeth close together,

the upper teeth badly decayed, with large collection of tartar. Three molars and one bicuspid on the lower jaw, one molar and two bicuspids on the upper, are lost from pyorrhœa. The remainder of the teeth were getting quite loose. The thyroid gland was arrested in its development. The wife, now living, aged fifty-nine, is rather a fine-looking American woman. The stigmata are not noticeable. The jaws are large and well-developed. Teeth were large and sound until fifteen years ago, when they began to decay. Tartar began to deposit at the time. About four years ago I extracted the lower incisor with my fingers. The teeth are decaying rapidly from age, grief, and worry for the conduct of her children. She had had four, of whom three are living. The oldest (a daughter, married sixteen years ago) has had nervous sick-headache all her life, with occasional epileptic attacks. She has a violent temper at times. She has no idea of the value of money, and resembles her father as far as stigmata are concerned. There is a V-shaped arch, and hypertrophy of the alveolar process. The pulps of her teeth die under gold fillings. All those I have filled I have had to extract on account of the persisting destruction of pulp and the possible formation of abscesses, which cause much pain. She has had no children because of an undeveloped uterus. She has led a questionable life, for which reason her husband committed suicide only a year ago.

The second oldest (a daughter) married twenty years ago, as a result of which two daughters were born. Before the birth of the second daughter her husband ran away because of her immoral conduct. Her features are regular, except that the eyes are small and set close together, like her father's. The jaws and teeth are well developed. The teeth are soft, and decay rapidly. Discoloration of the molars and bicuspids, with abrasion and erosion (only slightly noticeable at present).

The third (a boy, now twenty-nine years of age) went through the public school, and is a fair scholar. He has never done a day's work, and leads a debauched life, and formed the opium-cocaine habit. He has been in the State Insane Hospital and a number of private institutions. He is a hopeless wreck physically. Although his intentions are good, he has no will power. He has a small head, receding forehead; small eyes, closely set; high cheek-bones; prognathous jaws; excessively large teeth, with very prominent cuspids, upper and lower. His head resembles very much that of the anthropoid ape. The teeth are very irregular and badly decayed. Supernumerary cusps upon molars; there are deposits of tartar.

The oldest grand-daughter (eighteen years old) is a tall, slender neurotic; full forehead, small nose, large eyes, cheek-bones prominent, upper jaw well developed, lower arrested; dental arches are normal. Pulps die under fillings. I have difficulty in preventing abscesses forming.

The youngest grand-daughter (fifteen years old) is also a neurotic, and resembles her mother. Her teeth are badly decayed, although they are regular. Pulps die readily. She has large thyroid gland. This girl has inherited the habit of biting her finger-nails (which are badly deformed) from her mother and grandfather.

This is a degenerate symptom, according to Bertillon and others.

Case III.—A girl, ten years ago, left her home one morning to attend school. She met a man with whom she was very well acquainted. They were married in the afternoon. Girl twins were the result after two years of married life. Both husband and wife were degenerates mentally and physically.

The conduct of the wife was such that a year ago the husband procured a divorce, he retaining the children. Her face is small, eyes small, set close, prominent cheek-bones, partially V-shaped arch. Teeth are irregular and badly decayed. She has large thyroid gland. Both are from old degenerate families.

In conclusion I wish to say that, in order to better understand the lesions of the oral cavity, we must obtain a better knowledge of the physiology and pathology of the body. I will reiterate what I have said many times,—that any advancement made in our specialty must be accomplished through a broad, liberal medical education.

NOTES ON FORMIC ALDEHYDE.[1]

BY J. MORGAN HOWE, M.D., M.D.S., NEW YORK.

Having been appointed by the president of this Institute a member of the Committee on Materia Medica and Therapeutics, these notes on this comparatively new therapeutic and prophylactic agent will be presented as a partial report from that committee, with the understanding that the other members will make additions to it during the discussion of the subject.

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[1] Read before The New York Institute of Stomatology, March 3, 1896.

As this substance has already been shown to have very valuable properties for our service, it is well worthy of our study. The results of my own use of it during the past year have been so favorable that I have looked somewhat into its chemical characteristics, and its literature. These have increased my interest in it, and have helped establish the conviction that it is destined to be of great service to us in several ways.

Formic aldehyde, or formaldehyde, is a gas, prepared by subjecting methyl alcohol (or wood alcohol) to oxidation. The chemical formula of methyl alcohol is CH_4O, of formaldehyde is CH_2O, and of formic acid is CH_2O_2. It is a product midway in the process of oxidation, between the alcohol and the acid. The first step in the oxygenizing process is effected by the loss of two atoms of hydrogen, and this change is expressed in the word aldehyde, contracted from *alcohol dehydrogenatum.* The next step in the oxygenizing process, which forms the acid, is effected by the addition of an atom of oxygen, as is seen by the formula.

As this gas is readily absorbed by water it is furnished to us in a forty-per-cent. solution, and in this condition is known also as formalin and as formol. As formalin is quite commonly used as a designation, and is, perhaps, a trifle more convenient, it is not objectionable, excepting its tendency to cause the chemical constitution of the compound to be lost sight of; for aldehydes, being as regular chemical compounds as alcohols or acids, are entitled, as such, to have their regular designations remembered. For this reason I have chosen to use the chemical name at the head of these notes.

Formaldehyde in solution, as we obtain it commercially, is comparable in a way to the solution of ammonia, with which we are all so familiar,—a gas absorbed by water, and capable of being diluted with water to any extent, so that any desired percentage may be obtained in that way.

Although its antibacterial action was noticed by Löw in 1886, it has only begun to attract much attention during the last two or three years. Berlioz and Trillat have demonstrated that anthrax bacilli were killed by a dilution of 1 to 50,000, and Drs. Slater and Rideal have shown that the growth of different specific micro-organisms was inhibited by its addition to the media in the proportions of 1 to 5000 up to 1 to 20,000; and soiled cloths from the post-mortem room were rendered sterile by soaking in a one-per-cent. solution.

A one-half-per-cent. solution has been used in surgical operations for irrigating wounds and washing the hands and instruments

of the operators, with better results than when other antiseptics were used for those purposes, and it has been used in a similar way in ophthalmic practice. Dr. J. M. Davidson, of England, has recently reported very favorable results from the use of solutions of 1 to 2000 and 1 to 3000 in abrasions of the cornea, and in hypopyon ulcers. It prevents suppuration and relieves pain, producing no irritation in the strength recommended, according to his experience. Whooping-cough has been successfully treated by spraying a one-per-cent. solution over the heads of the patients; and experiments are being made similarly in the treatment of pulmonary consumption.

In bacteriology formaldehyde has been found of great service in the arrest and fixation of development, at any desired stage; and for preserving and hardening anatomical and microscopical specimens it has served the purpose better than either alcohol or Müller's fluid.

This agent has been proved to have such extraordinary disinfecting power, together with non-toxic qualities, that one-half-per-cent. solutions are recommended as fully adequate for the general disinfection of sick-rooms, infected clothing, books, and furniture, by means of spraying apparatus; and for the disinfection and deodorization of vessels, closets, waste-pipes, etc., and their contents, by simply pouring over them. A one-per-cent. solution has been found amply sufficient for almost all disinfecting requirements, and from one-fourth- to three-fourths-per-cent. solutions are strong enough for most purposes. In these latter dilutions Professor Cohn has found it capable of preventing the development of the bacteria of putrefaction, and aqueous infusions thick with bacterial life were cleared by such additions, the dead bacteria sinking gradually to the bottom, and the offensive odor disappearing.

Formaldehyde has been used to some extent as a preservative of milk in Great Britain. It has four times the potency of any other antiseptic commonly used for that purpose. Four or five drops of the forty-per-cent. solution has prevented the souring of one hundred cubic centimetres of milk for six weeks. If it has been used for such purposes in this country, the fact does not appear to be generally known, for it was not mentioned by physicians discussing the adulteration of milk, at a meeting specially considering that subject, held last January, in the New York Academy of Medicine.

My attention was first called to formaldehyde, or formalin, by the remarks made by Dr. Louis Jack at a meeting of the Academy of Stomatology, and reported in the INTERNATIONAL DENTAL JOUR-

NAL for March, 1895; in which he related the cure of a pulpless, irritable tooth, that would not bear stopping up, by means of two applications of this remedy. It appears that Dr. Kirk had spoken of this substance to Dr. Jack. He having learned of it from Dr. Mascort, who had treated indiscriminately many cases of alveolar abscess with it, at the St. Louis Hospital, and was quite enthusiastic over its use "as a root-dressing for putrescent cases."

On March 28, 1895, Miss B. (an invalid) called for the treatment of a lower bicuspid that was pulpless, and in that peculiar, irritable condition that will not endure the occlusion of the pulp-canal. The family had been my patients for some years, but this member had been referred to another dentist nearer to her home, because her poor health prevented her from being certain of ability to keep appointments, and this particular tooth had been—at the time of her call—under treatment for three months. The tooth was treated for several days before I recalled the reference to formalin I had read nearly a month before, and during this time various remedies were used with some apparent benefit at first, but later with renewed increase of irritability.

At this time, when convinced that I had gained nothing by what I had done, I looked up the record and obtained some formalin in five-per-cent. solution. The first application was made on cotton in the root-canal, and covered with cotton saturated with sandarach, so that the patient could remove it if necessary. She caught cold next day, and sent word she could not keep her engagement, and I did not see her for nine days. When she called again the dressing was *in situ* as I had placed it, and she had felt no discomfort from it. I renewed the dressing, covering it this time with a temporary gutta-percha stopping, and six days later the root was filled with oxychloride of zinc. This tooth gave no trouble after the first dressing of formalin was placed in the root-canal, and has continued perfectly comfortable and useful until the present time.

I have since had several similar cases to treat, and the application of formalin in five-per-cent. solution has been successful in all but one. The key-note of the remarkable and unique influence of this remedy is struck more clearly, I think, in this particular class of cases than in any other. No other medicament that I know of has such an effect. In the case described at length above, the other dressings used were impotent to enable the tooth to bear occlusion of the vent for more than a few hours at the best.

The exceptional case referred to was a cuspid that had been open and discharging slightly for several years, and careful exami-

nation convinced me that there was an opening through the side of the root near the apex.

Since using formalin successfully in the first one or two peculiar cases already referred to, I have gradually used it more indiscriminately in the treatment of pulpless teeth, without fistulæ, and have found it peculiarly and wonderfully effective in disinfecting them, and removing all tendency to irritation from admission of air, or efforts to cleanse and prepare the root-canals, or from subsequent filling of the roots.

After considerable use of this substance, I discovered that it was possessed of decided deodorizing power, before I had consulted its literature sufficiently to find that this quality is claimed for it, as has been noted above. In one recent case in which I tested it, an offensive molar was treated in the root-canals with electrozone, without removing the bad odor, but a two-and-a-half-per-cent. solution of formalin made it quite free from all offensiveness in a few minutes.

I have not used it in the treatment of alveolar abscesses with fistulæ, but have tested its efficacy a few times in pyorrhœa alveolaris, and found that it seemed to have no special influence to diminish the formation of pus. My judgment of its therapeutic influence on tissues, to which it is applied, is that its special sphere is to allay irritability of the tissue and prevent inflammation and suppuration. It may have greater influence in reducing suppuration, and in favoring a return to normal conditions after pus has formed than I have discovered, and I hope that something more definite on this point will be reported in the discussion of this subject.

It is a powerful irritant, and the warning that Dr. Jack gave in the record before referred to—that is, that it should not be used in greater strength than a five-per-cent. solution—may well be heeded. Its application in root-canals in that dilution will sometimes cause pain, and I have even found it to give evidence of irritation in a two-and-a-half-per-cent. solution. But the pain has always passed away in an hour or two, when the dressing was left in the tooth, and has ceased in a few moments after the removal of the dressing, in those cases that caused complaint at the time. These evidences of irritation have been only in exceptional cases, and I have concluded, from my clinical experience, that it is most likely to cause pain when it is applied in the root-canals of teeth whose pulps have been recently destroyed; for which other dressings would have been better. The inference is that its irritating properties are overcome by chemical action when it is brought into contact with putrescent

matter. In my recent use of formalin I have found a two-and-a-half-per-cent. solution answer the purpose so well, both as a deodorizer and disinfectant, that I am inclined to believe that a stronger application is unnecessary. I have disinfected many putrescent pulp-canals with this substance in the two-and-a-half-per-cent. as well as the five-per-cent. solution, and filled the roots at subsequent sittings without the use of any other agent whatever for treatment, and have had remarkably satisfactory results.

In two cases only pain and swelling to a very limited degree followed the filling of the roots, and this I attributed to my own or the patient's anxiety to get the work finished, and off the list; being due rather to an error of judgment in filling too soon than to lack of efficacy in the formalin dressing. Formalin has some coagulating action on albumen, which is apparent even in the action of the two-and-a-half-per-cent. solution a few minutes after its contact with the white of egg. But the coagulating action of the forty-per-cent. solution is very much less decided than pure carbolic acid. Electrozone has no coagulating effect whatever. A five-per-cent. formalin solution added to meat broth,—that had been infected by a broach used in a putrescent pulp-canal,—and allowed to become putrid, showed in a test-tube much more vigor of chemical action and rapidity of clearing of the infection than did a similar test of electrozone added to the same putrescent liquid. I have found formalin to be very efficacious in disinfecting, without causing irritation, those cases of quiescent pulpless teeth whose pulp-cavities demand opening, but are very liable to have pericementitis supervene as a result of such opening.

When I was a young man, I was very much distressed by the evidence that was often presented to me that I had precipitated pain and suffering upon my confiding patients by opening their pulpless teeth. But I found, to my astonishment, that those whom I considered wise men could give me no special light or encouragement on the subject. Indeed, most of them denied that the opening of such teeth was the cause of any special solicitude to them. They applied some medicament which in their hands always prevented trouble, and each one had a different remedy; but in my hands afterwards none of these agents proved of sure value in preventing inflammation, as the result of opening pulp-canals with putrid contents, that had been closed and were not causing irritation at the time.

Dr. James Truman wrote in the "American System of Dentistry," 1885, "A dead pulp may remain for years—and it may be for

life—very quiet if not exposed by caries, but may, in a few hours, produce violent pericementitis if exposed to the action of the atmosphere. It is, therefore, oftentimes a question in the diagnosis of such a tooth whether the great risk warrants meddling with it at all."

I think there is now a general recognition of the danger attending this procedure, but I fear it is not by any means universal among dentists, and I call attention to it to emphasize the importance of its being recognized, as well as to record the usefulness of formalin as an efficient preventive.

I had not found anything to serve the purpose as well as iodoform dissolved in alcohol and ether until the advent of electrozone. In 1884 I read a short paper on antiseptics, in which I referred to iodoform as the most effective safeguard against inflammation, as a result of opening quiescent pulpless teeth, and until I began to use electrozone as a disinfectant I had not dared to rely upon anything else in such cases. I have used the latter, however, with satisfaction ever since its introduction, and it undoubtedly has a certain soothing and reducing influence on inflamed tissues, besides its antiseptic power.

In exactly what cases, and in what conditions, solutions of formaldehyde will serve better than electrozone or other agents it will take some time to determine. Each remedial agent that we have has its limitations, and each has a sphere of influence that makes it better adapted to certain conditions than anything else would be, but there is no doubt that formaldehyde is a valuable addition to our list of medicaments, and it is probably destined to take the place of most of the prophylactics we have used heretofore. It simplifies and renders easy the sterilization of instruments and of everything that needs disinfection, and there can be no doubt that a one-half-per-cent solution is perfectly efficient for such purposes after the article has been previously cleansed in an ordinary way. Such a solution does no harm to steel instruments, other than results from the application of water, and Drs. De Buck and Vanderlinden, of Ghent, have found it more efficient than a two-and-a-half-per-cent. carbolic or a 1 to 500 sublimate solution.

I have noticed that an antiseptic lotion advertised for a mouthwash has in the published list of ingredients a 1 to 1000 solution of formaldehyde in a proportion not given. I find that a one-half-per-cent. solution of formaldehyde, if rinsed vigorously about the mouth, produces a stinging sensation, suggesting the effects of capsicum, and even a one-fourth-per-cent. solution does not cease to have a

similar effect on the mouth and fauces, although the sensation of astringent action is also perceptible with the latter. As far as antiseptic power is concerned, we may certainly count upon its value here also, but what medicinal effect it will have on the mucous membranes and gum tissues will have to be determined by experimental use.

It is apparent that this substance has a medicinal influence aside from its antiseptic effects, and that a great portion of its value to us depends upon its peculiar medicinal action. The irritable condition of a pulpless tooth that will not bear stopping up is not amenable to control by antiseptic treatment alone, unless the agent used has also a medicinal influence on the tissues. And the same thing is true regarding the contents of pulp-canals in pulpless teeth that threaten to produce irritation by access of air or germs. The application of the most potent antiseptic is not so certain to avert unfavorable symptoms as is the use of iodoform, which is rather low down in the antiseptic scale, but which has a certain power aside from germicidal action that produces a beneficial effect on living tissue. In other words, the usefulness of medicaments, suitable for the treatment of abnormal conditions of living tissue, cannot be expressed in terms of antiseptic power. The latter has engrossed attention to such a degree during recent years as almost to exclude the fact altogether that almost every agent used has a medicinal or toxic action, which may be beneficial or the reverse.

The preserving and hardening effects on tissues that have been manifested by formaldehyde suggest that it may be found of service in efforts to preserve and make innocuous those dead pulps, or portions of pulps, that circumstances make it desirable or expedient to leave *in situ*. Any simple and quick means of accomplishing this would result in such great saving, to both patient and dentist, that all must regard it as a desideratum.

Probably we would all agree in the opinion that no treatment of a pulpless tooth can ever fulfil the requirements of placing it in the safest condition for the longest time, as does the complete filling of the root-canals with an impermeable substance; but there is a possibility of approximation to the ideal condition of safety by some other less arduous and expensive method. Several experimenters and writers have discussed this subject in recent years, and I hope this new agent—formaldehyde—may serve to forward to success efforts in this direction. The teeth of the multitude, who cannot afford either time or money for difficult and expensive operations, need to be saved by simple and inexpensive methods, and I am sure

we all sympathize with every effort to render the process of saving teeth easy and simple.

In commending formaldehyde to your attention and study, it is with the conviction that it is to be a very valuable addition to our equipment of therapeutic agents. The limitations of its usefulness will soon be discovered, but at present its value is undoubted in the treatment of foul pulp-canals, and irritable apical tissues, and in the disinfection of anything that needs such cleansing.

A TALK ON MATERIA MEDICA.[1]

BY DR. E. C. BRIGGS, BOSTON, MASS.

I AM perfectly aware that a short time ago I read a paper on "The Dentist as a Prescriber of Drugs," in which I am opposed to the dentist going very much into the constitutional treatment of his patients. At the same time we do have to use drugs, not only locally, but at times systemically. I will begin with the first thing that I have jotted down, and that is, the preparation which I give patients as a soothing application. It is a mixture of equal parts of chloroform, laudanum, and tincture of camphor. That preparation is a stimulant and a slight anæsthetic.

A patient will come into your office complaining of some little trouble, some irritation or soreness of the gum, or some inflammation which it would be unwise to attempt to treat at the time, and for such cases I keep this mixture put up in a little vial; and when I think it is needed I tell the office girl to give the patient a bottle of "No. 3," as we call it. Now, that serves a double purpose: it is really very soothing in its effect, and it gives the patient something to do. That is one of the points I want to call your attention to, —the importance of doing something for the patient at such times when they are not quite ready for surgical treatment; when you are waiting, perhaps, for something to declare itself so that you can make a more clear diagnosis.

In cases where you have filled a root and the patient is threatened with some pain about the root of the tooth, perhaps periostitis or periodontitis, or pericementitis, I have found it

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[1] Read before the American Academy of Dental Science, December 27, 1895.

necessary in many of those cases to prescribe for the patient some analgesic. In many of these, where it is impossible to do anything surgically, I find that I can do a great deal for patients by giving them some medicine; and of the analgesics which have proved to be not only safe in my hands, but of really great value, are the recent antipyretics that have been discovered,—the several petroleum preparations, acetanilide, phenacetin, etc. One of them, which I have used with marked success, is a proprietary preparation, called "antikamnia." If any of you have never used it, I would recommend you trying it. It is an antipyretic and analgesic, and is composed of acetanilide, with bicarbonate of soda to render it more agreeable to the stomach, and caffeine, the tendency of which is to overcome any depressing effect which the acetanilide might have on the heart. The average dose is three grains, and four of these doses you will find will relieve and stop pain about the facial nerves; such, for instance, as toothache, periostitis; and do it far better than any amount of morphine, and will leave the patient in good condition for the next day. I have found that in giving morphine for toothache the patient must have so much of it to overcome this local pain as to be saturated with it, and to be made ill by it, and it takes a week sometimes to get over the effect, and in the majority of cases the pain has been but indifferently relieved by the drug.

Another drug that is very valuable to us is phenacetin, which is closely allied to the acetanilide which I spoke of, and they are both derived from phenol. This is also safe and very reliable in pains of the kind mentioned, and an excellent form in which to administer it is to give it with the citrate of caffeine.

The use of the hypodermic syringe is something that we are becoming more and more familiar with, and we must use it a great deal more in the future. Every man ought to familiarize himself and be accustomed to the use of the hypodermic syringe, so that he may be prepared for cases of collapse and other accidental conditions which may arise. I had a case a little while ago where a patient collapsed from shock, and associated with it was a tobacco heart, and he really seemed to be about to expire. It was a comfort to feel that with the hypodermic syringe I was able to inject brandy under his skin, for he was beyond the ability to swallow. One should be ready in such a case to inject brandy and water, or ammonia, as a heart stimulant; also atropine, and possibly nitro-glycerin. It is a great feeling of satisfaction to know that you were ready when the emergency presented.

The heart can also be reached by the use of nitrite of amyl. Sometimes you get cases of collapse, syncope, when you are using cocaine. I do not think that we often get collapse by cocaine-poisoning, I think it is almost always shock; but, of course, in that case you have to recognize that it may be possible that the cocaine is poisoning the patient, and the nitrite of amyl is a very excellent antidote for cocaine-poisoning. It is bought in these little glass capsules, and it is no skill or effort to prescribe one or to use one,—you simply break it in a napkin and let the patient breathe it. It dilates the capillaries immediately and relieves congestion of the heart, and the circulation is re-established. Right in this connection it is well to speak again of the cases of tobacco heart, and I think we are getting a great many of them. The patient who is afflicted with tobacco heart is just as likely to die in your office as he is to die anywhere, and if there is a little shock, a sudden violent pain, he collapses; if he were somewhere else he probably would die when such a shock occurred. It is highly important that we should be ready to meet such an emergency, should it happen in our office, as it would be very embarrassing and distressing to have him die there.

Then the question of local anæsthesia is an important one,—the injection of weak solutions of cocaine submucously, subcutaneously, under the gum and skin. It is one of the greatest helps in practice. Take, for instance, the cases of pyorrhœa which need a very heroic treatment, and where, if the patient be not insensible to pain, in nine cases out of ten you will not do the treatment properly,—you cannot do it. Then in cases of opening into the antrum and in the many cases of abscess, local anæsthesia is of great assistance. Not long ago a patient came to me who had been suffering, walking the floor for three days and nights, with inflammation about the lateral. His dentist had told him he could do nothing for him, as he could not find the cause of it. I opened into the pulp-chamber and found it perfectly clear and free, but the man was suffering and the tooth was so sore and lame it could hardly be touched. Now. the injection of a little cocaine about the root of the tooth enabled me to drill through the foramen and to relieve him immediately of this terrible pain, which was caused by a very slowly-forming abscess. It ought to have been formed a couple of days before, but it had not, and there was no swelling to indicate that an abscess was forming. One, of course, could cite innumerable cases where pain has been relieved in this way. The solution of cocaine that I use is made from Schleich's formula,—viz.:

℞ Muriate of cocaine, 20 centigrammes;
Muriate of morphia, 25 milligrammes;
Chloride of sodium, 20 centigrammes;
Water, 100 grammes,
with a couple of drops of a 1 to 100 solution of carbolic acid.

You can even double the cocaine and still be very safe. Supposing you double it, it is only $\frac{4}{10}$ of one per cent., and yet that solution, if injected, will enable you to work with great freedom. In the selection of a hypodermic syringe it is very important to get a very, very fine needle. That is where a great many men are intimidated and fail, and think that the use of the drug is as bad as the pain, and it is if you are going to punch in a great clumsy needle; but you can get fine needles which can be inserted with almost no pain.

Then this question of antiseptics is one which is agitating us all the time. I think we are getting over it a little; we are recovering from the germicide fever,—that idea that we have to put something into every case that is strong enough to kill every germ. I think that is struggling too much for one particular point. We must keep in mind that for the process of putrefaction there must be certain conditions: the germ must be present, and it is necessary to have air and the right condition of heat and of moisture. Now, if you take any one of those away you will stop the trouble. The devotion of our entire attention to simply one element of the ferment, the germ, has been carried almost too far,—so far, that the reaction has set in to the extent that some men profess not to use any antiseptics. This is fully as irrational as the use of the very powerful germicides. If we can in our operations employ proper antiseptics, mild ones, non-poisonous to the general system, why there can be no harm in making assurance doubly sure, but you must remember that if you have not a good bed for a germ it is not going to get in there.

One of the new drugs which you have heard of, and probably most of you have used, I thought I would speak about, because I have found it so very useful myself, and that is, trichloracetic acid. When acetic acid is acted upon by chlorine, it yields three different combinations; the monochloracetic acid, the dichloracetic acid, and the trichloracetic acid, and this trichloracetic acid was discovered to have some special action as a tonic, astringent, and stimulant to the mucous surfaces, and it is also claimed—and I think with truth—to be decidedly effective in making it more easy to remove dental calculi, and it seems to me that in actual practice it has proved to be so; at any rate, it is very excellent in its tonic and stimulant

effect on mucous surfaces. The nasal specialist has found it to be of value in the treatment of some of his most obstinate cases, and it is used in antral troubles, in different solutions, according to the case.

The uses of bicarbonate of soda I do not know that all of you appreciate. It is a very simple thing, and one of the beauties of it is that it is so simple and safe that it can be put in the hands of the majority of patients without fear of it doing any harm. Obstinate cases of inflammation about the gum, with puffy, swollen membrane, will yield to this treatment, and the inflammation will subside. I have found it to do good work when other things have failed. It is used with very great benefit in cases of sensitiveness about the necks of the teeth. I have always been a great believer in bicarbonate of soda, and I like to commend it particularly to those who have not used it in the treatment of such cases as I have described.

A word or two about general anæsthetics. Of course, not all of us use anæsthetics, but still the progress in the use of the different agents for producing anæsthesia has been marked of late years, and the subject is of interest to us all. The importance of true anæsthesia is to be borne in mind, and that you do not want to carry it beyond that point. If you give an unlimited amount of any anæsthetic to a person and carry it to narcotism, you are doing only what you would do with any poisoning drug when you go beyond the prescribed dose. If you were administering opium and morphine, you would consider it extremely dangerous to give more than the maximum dose, and yet in the administration of anæsthetics an unlimited amount is provided without much thought of the true therapeutics, the true point to which they wish to carry the patient,—that is, anæsthesia without carrying it into narcotism.

Right here it is well to speak of the relations of chloroform and ether. Previous to the investigations of the Anglo-Indian Commission at Hyderabad, it was supposed that chloroform stopped the action of the heart first, and that ether was safer because it stopped the respiration first. This commission, of which Dr. Lauder Brunton was a member, found that chloroform acted on the respiration first, just as ether does; the only thing is that it is a more delicate drug; it does not take such a dose to produce the narcotic state, and, therefore, it has to be used more carefully.

Men who practise in a specialty of medicine ought to understand how to use drugs in a proper way which it is necessary for them to use in their specialty. I believe that later on we shall use chloroform a great deal more than we do now, and it would simplify mat-

ters a great deal; when there is a question as to what anæsthetic we should use, if we better understood the qualities and effects of chloroform. Statistics show that in only .0008 of one per cent. of cases where anæsthetics are administered are there deaths. Of those, if we weed out the ones that are produced by careless overdosing, the ones who died from shock (which might have occurred from any shock), we have an exceedingly small percentage which we can apparently charge to anæsthetics themselves. Many of the fatalities which are credited to anæsthetics would, if investigated, be found due to other causes. One man in the autopsy was found to have had an abscess in the brain; others have been found far gone in kidney trouble and heart-disease,—and it simply was an accident that they should have died at that particular time. They were likely to die any minute, and as a matter of fact they died easily under an anæsthetic.

Dr. Keep, of Springfield, has lately made some researches in the use of anæsthetics, and he speaks very strongly about the ability to use chloroform if one uses it rightly, and he gives the dose of chloroform to be half an ounce at the outside. He sometimes combines it with ether, in which case he gives an ounce and a half of ether, but his dose of chloroform is only two drachms. He says that when properly administered complete anæsthesia can be obtained, and he fails to see how anybody who has not either one of these severe troubles, kidney, brain, or heart, could possibly suffer from that amount.

Dr. Louis Sayre, of New York, has used chloroform for years in five- to twenty-drop doses, and he has repeatedly asserted it was perfectly safe to use. His method is to give doses of from five to twenty drops and to exclude all air, except what was necessary to force the chloroform, and, carrying the patient quickly under this influence, performs his operation without causing the patient any pain.

Reports of Society Meetings.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A MEETING of the Institute was held on Tuesday evening, March 3, 1896, at the house of Dr. C. O. Kimball, 27 West Thirty-eighth Street, the Vice-President, Dr. C. D. Cook, presiding.

The minutes of the last meeting were read and approved.

The Chairman.—We are able to give a few minutes to communications on theory and practice. Has Dr. Allan something to say?

Dr. Geo. S. Allan.—Some time ago, when I was in Boston, my friend, Dr. E. H. Smith, showed me a series of plates that were designed by his father-in-law, Dr. Shaw, for spreading the upper and lower jaw in regulating. I have tried them in my own practice, and they have been so successful that I begged Dr. Smith to send me on a complete set of the plates so that I might show them this evening. The plates really explain themselves, one being for the purpose of spreading the anterior part of the upper jaw only, as in the ordinary V-shaped mouth, while another one will spread the entire arch. The plates are operated by various little screws, and the force is a positive one; the process of widening the jaw goes on without special inconvenience to the patient, and without the slightest risk of a set-back or loss of time. The amount of pressure can be regulated with the utmost nicety. The same principle is applied to the lower jaw, except that with the lower plates he uses a spring which is detached from the plate. These plates were referred to and partially described by Dr. Shaw in the *Dental Cosmos* for April, 1888.

The principle, I am convinced, is one that can be applied with success in almost any case where spreading of the jaw is required, and in my experience is vastly superior to the Coffin split plate, which I have used a good deal in the past.

Dr. C. A. Woodward.—Does Dr. Allan think the principle upon which these plates are based superior to the Jackson method?

Dr. Allan.—I do not think the Jackson method is equal to this. The fulcrum, the base of support, is better, and the pressure can be better regulated.

I have another little matter to which I wish to call attention

After a gutta-percha filling is placed in position it is often a matter of a good deal of difficulty to trim off the portions which overlap the margins of the cavity. The ordinary way is to take a warm instrument and cut it off. But that has its difficulties, and it is not a practical way at all times. I have been in the habit for some time of using little knives for that purpose. These knives fit into a socket-handle, and one can go around the neck of the tooth with them and reach almost any position to trim off the superfluous material in much less time than it would take with a warm instrument, leaving also a clean-cut surface. These four sickle-shaped knives constitute the set.

Dr. C. O. Kimball.—I would like to call attention to a plan for the registration of operations upon cards, somewhat similar to the card catalogue of a library.

Each patient has a card about nine by seven inches, with diagram of the mouth and numbered spaces for dates, a column of spaces being reserved for records of "cleansing." The operation is noted on the diagram, a single figure referring to the date.

The cards, arranged alphabetically, are kept in the drawer of a case made for the purpose, which is fixed to the wall close to the operating-chair. When work is begun for a patient, this card is taken from the drawer and placed, also in alphabetical arrangement, in a small desk at the top of the case, and kept there till the series of appointments is completed. When each patient comes into the room his card is turned down so that a complete record of all my operations for him lies before me while at work.

Operations on the temporary teeth are noted on a paper diagram temporarily attached to the card, which can be removed and destroyed when the temporary teeth have all been replaced by the permanent ones.

I have had this system in practical use for over twenty-five years, and have proved its value in many ways.

Dr. W. St. George Elliott.—I would like to ask Dr. Kimball whether there are not some objections to the card plan of keeping professional accounts. Several years ago I adopted a similar plan, my cards being larger, however, and the diagram of the teeth was on two horizontal lines. The rest of the card was arranged on a plan I had used a number of years, the main feature of which was a three-inch line for remarks for each operation. While practising in London I kept very full accounts of each operation, nature of the case, kind of filling material, kind of mallet, etc. I had expected to draw up some sort of a table, showing the advan-

tages of certain modes of treatment, etc., but retired from practice before I had made any use of the eleven years data. When I reentered practice, over a year ago, I adopted the card system as an experiment, but was not altogether satisfied with it. The main objections are cost, cumbersomeness, and liability to misplacement; they are not so well adapted to the profession as the usual ledger. I will admit, however, that they have some marked advantages, the principal being, having a card before one instead of a large book, and the ability to withdraw from the lot of cards those of patients who have died or have gone away, a very material advantage.

Dr. Kimball.—The system is very simple. It is merely the record of the work, the accounts being kept in another place. The cards are placed alphabetically in a drawer, and kept there. A card is taken out from the drawer and put in the small desk when the patient first comes, and is returned when his work is completed. I have never adopted the keeping of records as fully as Dr. Elliott has stated. My record shows the general kind of operation, what the filling was, when it was put in, and its shape in relation to other fillings, principally for the sake of identifying the work, watching my work, and knowing how it stands. If there are any details which I wish especially to note, as any peculiarity in the filling or operation, I do so upon the margin or back of card. I will exhibit the cards.

Dr. Elliott.—In starting a new society, we are naturally ambitious to take a higher position than most societies, and I do not know of any way that would tend to so much usefulness or draw so much attention to our work as to have our papers and remarks properly illustrated. An outline drawing is quite sufficient and is not expensive.

Dr. E. A. Bogue.—Something that one of my patients said the other day interested me so much that I would like to repeat it. It is this: "That phosphate filling that was put in for me the other day—after being stearinized or paraffinized—felt smooth just like gold, and had none of the acid taste that such fillings have for a day or two. It is the first time a phosphate filling has ever failed to give me annoyance, although I have had a good many put in my mouth."

The Chairman.—I would like to ask if that bad taste occurs when the phosphate has been properly ground.

Dr. Bogue.—This lady had had phosphate fillings put in anywhere and everywhere. I do not know how they were done.

The Chairman.—I will now call on Dr. J. Morgan Howe, the chairman of the Committee on Materia Medica and Therapeutics, to make a report for his committee.

(For Dr. Howe's paper, see page 286.)

The Chairman.—The secretary will now read a communication which has been received from Dr. Louis Jack, of Philadelphia, upon this subject, after which discussion will be in order.

Dr. Jack.—In the use of formalin I have not had much experience. Since the range of employment does not appear to be wide, and as it is a powerful agent, one should be cautious in its application.

Its chief value depends upon its rapid diffusibility, and for this reason it is serviceable for the disinfection of the dentine in canals which have been long subjected to the presence of putrescent material. For this condition I have used five-per-cent. solutions with apparent advantage. This would be indicated by my experience to be as strong a solution as it is safe to employ. At this strength it is necessary to protect the adjacent tissues by sealing the saturated pledget in the pulp-chamber and canal, allowing it to remain for a few hours. It is important not to force the solution through the apical foramen: concerning this accident I had a serious experience when, notwithstanding the existence of a fistula, great pain and continued irritation was excited which slowly yielded to treatment. The effect upon the fistulous tract in this case was not curative since the suppuration was not arrested, as would probably have followed the application to the same *situ* of zinc chloride ten grains to one ounce of water.

In exposures of the pulp, preparatory to conservative treatment, I have frequently used and have found a solution of five per cent. of formalin serviceable where there had long been caries with rather broad exposure. For recent exposures, when the bacterial invasion of the dentine were less, I used two and one-half per cent.

As the value of formaldehyde depends upon its quick diffusibility, therefore its use would appear to be confined to conditions which require penetration of structures. Its irritating properties, on the other hand, limit its use as a topical agent for superficial disturbances, as they occur in the mouth. I am not prepared to give an opinion of percentages lower than the smallest rate I have above stated.

Dr. Allan.—A little over a year ago I began to use formalin, having heard of it through Dr. Jack, as Dr. Howe did; and my experience with it has been such that I do not well see how I

could get along without it. In the class of cases Dr. Howe describes there is a great deal of irritation and pain, not accompanied by a formation or discharge of pus, but simply due to some peculiar condition, and a permanent stopping is not possible, as intense pain follows closing the root-canal. In these cases I have found that an application of a three-per-cent. or five-per-cent. solution of formalin will almost always work a thorough cure, one application often being sufficient. I treated a lower bicuspid for my brother for nearly a year, possibly longer, and as he lives at Newburgh, I could see him only occasionally. Sometimes I thought I had made a success of it, but he would write me in a day or two that the filling had to be removed. The last time he was down, about two months ago, I treated the tooth with a five-per-cent. solution of formalin, following it with hydrogen dioxide. In a week or so he wrote me that he had some pain after the treatment, but not sufficient to induce him to have the filling taken out. After a little the pain entirely subsided, and the tooth is now ready to fill permanently. While in formalin we have almost an ideal preparation for the class of cases which Dr. Howe has alluded to, we have not yet secured all we need. Formalin will unite with the albuminoids and organic tissues to form a fairly permanent compound; not wholly permanent, for with the access of germs sooner or later putrefaction will take place. There is no doubt of that.

Formalin is employed in the laboratory for hardening tissues preparatory to section-cutting, and is a most valuable agent; but if a mass of tissue so hardened is taken from the solution and exposed to the air of the room, germicidal action soon commences and decomposition and destruction of the tissue follows.

Formalin has an irritant action, irritating the skin or mucous membrane to which it is applied; it has an escharotic action, and kills tissue in strong solutions, but it is not toxic in character, nor is it poisonous when administered even in strong doses; therefore, in weak solutions, it is exceedingly valuable as a mouth wash, and in all preparations to be used on the teeth. I have used formalin a great deal in ordinary cavities where I wish to bring about an aseptic condition preparatory to filling. Formalin is exceedingly penetrating; being an aqueous solution, it is more penetrating than any of the essential oils. I have used it in ordinary cavities, as strong as a ten-per-cent. solution, and what pain followed passed away rapidly and no harm resulted. I am very favorably impressed with its use in such cases. I have not used it long enough to say anything more, except that it is probably the best all-around

antiseptic and germicide that we have had brought to our attention. I use it constantly to dip instruments in when cleansing the teeth, removing tartar, etc., about one-half of one-per-cent. solution, not stronger than that, and I have never had a patient complain of pain, irritation, or troublesome action on its part. I am very glad that Dr. Howe has thought best to bring this agent before us, and I heartily indorse all he has said in its favor.

Dr. S. E. Davenport.—I should like first to compliment Dr. Howe upon his complete report of this comparatively new remedy. I think it proves that Dr. Allan, the chairman of the Executive Committee, who I think suggested the formation of these committees in our Institute, made no mistake, and that our president, Dr. Lord, knew what he was about when he appointed the chairman of the Committee on Materia Medica and Therapeutics. Through Dr. Howe's courtesy I have been in possession of a vial of formaldehyde, five-per-cent. solution, for six months, and while I am not one who takes readily to new remedies, and use probably fewer medicines in my office than most operators, I have in quite a number of cases which refused to yield to the remedies I have been more accustomed to use, given formalin quite a thorough test. One case I remember in particular,—I will not enter into details, except to say of it that twice within three weeks did I leave my dinner-table to remove the temporary stopping from this inferior third molar, it having been treated with other remedies,—with electrozone once, by the way,—but when formalin was used as a dressing I was able to eat my dinner in peace, and the tooth is now filled and comfortable. I think it might be well, if Dr. Howe is willing, not only for our information, but for the readers of our proceedings, for him to say a few words regarding the reduction of formaldehyde from its forty-per-cent. solution to the different strengths which have been mentioned in his report.

Dr. Howe.—I think the easiest way that it can be presented is to regard the forty-per-cent. solution as forty parts of the drug formaldehyde, divided by a unit of water, instead of a hundred parts of water, which it really is. If we take an ounce, or a teaspoonful, or any amount, and consider it as stated, and desiring a one-per-cent. solution, we add thirty-nine teaspoonfuls of water,—supposing that we use a teaspoon to make our dilution,—and we have divided the forty parts of formaldehyde by forty parts of water instead of one, which we took as our starting-point. If we want a five-per-cent. solution, we add seven teaspoonfuls of water to one teaspoonful of the forty-per-cent. solution: we have divided

the forty parts of the pure article by eight instead of one, and have obtained a five-per-cent. solution.

Dr. Bogue.—Will Dr. Howe tell us whether this solution is a permanent one, or subject to deterioration?

Dr. Howe.—I think it is very little subject to deterioration. One writer only, whose remarks on that point I have observed, claims that it requires to be fresh. On the other hand, there are many who claim that it is remarkably stable. Almost all the alcohols are, I think, liable to full oxidation, which converts them into acids, as is shown in the facility with which wine and cider are converted into vinegar, if there is access of air. But the oxidation of methyl alcohol seems to be capable of permanent restraint at the aldehyde condition. It is claimed that forty-per-cent. solutions, kept in stoppered bottles, showed only a maximum increase of one-tenth per cent. of formic acid in eleven months. I have some that has been in my office over eleven months that seems to be perfectly good.

Dr. Allan.—Fearing that I may be misunderstood I will say that the formalin of commerce, which is a forty-per-cent. solution of formaldehyde, has been my basal preparation, and the different solutions to which I have referred have been made by reducing formalin by the addition of water.

Dr. Davenport.—Then Dr. Allan's ten-per-cent. solution is Dr. Howe's four-per-cent. solution.

Dr. Howe.—If the manufacturers of the solution tell the truth, they have made a forty-per-cent. solution of formaldehyde in water. I had not thought of accepting this as the unit of value, because it is a solution of known strength, and is presented in this form for convenience only. I think the name formalin is used by most persons only as a contraction of the real name, and not as adopting the production of one manufacturer as the original article with which we are dealing. I should not consider it desirable to adopt the proprietary name of an article in which no one has any proprietary rights, especially as by so doing we would be liable to lose sight of the chemical nature of the article. And I think it would lead to confusion to regard a solution as if it were the original substance, and refer to percentage solutions of a solution, instead of referring back to the compound itself.

Dr. C. F. Ives.—It is a little less than a year since Dr. Howe gave me a sample of formalin, and I think that it is one of the best remedies I have had. I want to speak of a case which came to me a few weeks ago. It was an inferior first molar. A dentist

out of the city had treated it for three or four months. It was so irritable that every attempt to close it resulted in pain, which made necessary the removal of the stopping within from one to three hours, and, becoming discouraged, the dentist concluded to let it alone. The tooth finally became so troublesome that the lady could not pack in cotton sufficiently tight to exclude food without having to remove it in the course of an hour. That is the condition it was in when she came to me. I applied the dam and dried out the cavity thoroughly, finding nothing in the roots to indicate any particular trouble. After a little necessary cleansing, I applied a five-per-cent. solution of formalin, carrying it to the extremity of the roots, and sealed with gutta-percha. I did not see the patient again for ten days, and when she came my first question was about the tooth. She said, "I have forgotten all about it, I have had no trouble from it since." I immediately filled both roots, and put a permanent filling in the cavity. That was two months ago, and I have heard nothing from it since. The day before yesterday a lower bicuspid having a very long and tortuous canal presented itself. In this case the pulp had been destroyed in Syracuse, and the lady was directed to attend to it when she reached here. She neglected it for four or five months, and when I saw her the face was very much swollen and she was suffering severely. I introduced a fine broach and passed it to the end of the canal, and, finding no opening, went through with a drill made from a fine banjo string, and applied a two-and-a-half-per-cent. solution of formalin. The result was that the pain ceased. Then I made one more application, and it is ready to fill permanently. It seems that just in those cases which resist everything else, formalin has a remarkable effect. I have made it a practice to swab out all cavities before filling with a five-per-cent. solution, and it has a marvellous action.

Dr. Z. T. Sailer.—I take it for granted that the medicine acts beyond the root, because, if the root is cleansed thoroughly and filled to the apex, trouble follows just the same as if a lesion exists in the membrane outside. It is a very great irritant, and I cannot see how it becomes curative, although it is possible, according to the evidence to-night. Dr. Allan cites the case of his brother, who, being a dentist, should be able to give us positive information in regard to this important question.

Dr. Howe.—I suppose that the trouble in the class of cases referred to, for which this remedy seems to be especially adapted, is a condition of irritability beyond the apex of the root; not *in* the tooth. The fact that formalin is a great irritant, and at the

same time capable, in dilution, of allaying irritation, is a peculiarity of the remedy that pertains to other drugs also, but generally in less degree. Medicinal action is something that no one, I think, can explain. I do not know that there is any explanation of the way each drug has its peculiar medicinal or toxic effect. Each one has an individuality in its effects, and the fact that it does so is something that we are glad to act upon, when we have the knowledge; accepting the fact and doing the best we can with it.

Dr. Allan.—The drug formaldehyde in strong solutions is a direct irritant, destroying the life of the part to which it is applied. In weaker solutions, not strong enough to exert a necrotic action, but having decided germicidal properties, it quiets pain by destroying the germs of putrefaction and inflammation. The pain from using a ten-per-cent. solution of formalin even on a sensitive tooth is very transient. In repeated applications I have never known the pain to last over five or ten minutes. This is, as I understand it, an explanation of the apparently contradictory properties of the drug.

Dr. Howe.—It is to be noted that germicidal properties alone do not fulfil our requirements, because no other germicide is capable of accomplishing what formalin does in certain conditions. Peroxide of hydrogen, bichloride of mercury, and electrozone are very effective in that sphere of action, but neither of them will reduce the peculiar irritable condition we have considered in the tissues just beyond the apex of a pulpless root. Formaldehyde does it very promptly. Its effect is different entirely from germicidal action, or is an effect in addition to that of germicidal action.

Dr. A. J. Weed.—I do not believe there is much irritative effect. I have used formalin to attack an abscess, washing out with a little salt-water and packing with antiseptic cotton dipped in formalin. My object was to see if there was periosteal inflammation. The patient did not complain of any decided pain.

Dr. Howe.—It did not produce pain?

Dr. Weed.—She did not complain of any more pain than from packing with cotton. I used a five-per-cent. solution, simply wetting the end of the cotton.

Dr. Howe.—It is in just such cases that formalin is so useful.

Dr. Kimball.—I am glad your attention has been called to the medical aspect of this question, because I think we have sometimes overlooked that in our treatment of the peculiar class of cases that has been described. In newly-opened pulpless teeth I have used for many years a first dressing of tincture of aconite, bearing in

mind its therapeutic action on the adjacent tissues. The result has been good, producing almost no irritating effect, and allaying any tendency to inflammation which may have arisen from admitting air to the long-closed cavity. Its effect has been very satisfactory, but I am glad to have this additional anchor to use in these troublesome cases.

Dr. Bogue.—I want to ask for some help, but before asking for it I should like to make a little acknowledgment to Dr. Howe for his kindness in giving me a sample of formaldehyde some months ago. Unfortunately I left it behind me last summer, and could not find it until two or three weeks since. I have had occasion to use it once or twice, each time with marked success. I found myself very ignorant in the use of it, and wanted to know more about it, and my presence this evening has been fortunate for me. The help that I want is right in the line of this committee's report, and it is also in the line of operative dentistry. We have heard a good deal of late about cataphoresis; we have been deluged with advertisements from men, professional and otherwise, in regard to an instrument called a volt-selector, and many of us have invested our pennies in it, and some of us, perhaps, have run in debt for it. I suppose we must have some new plaything every little while, or we are not happy. I should like to have the members of this society tell me what is the use of the so-called "volt-selector." It is said to produce certain effects in two directions where we need assistance very much, and possibly in a third. Those two directions are in the anæsthetization of sensitive cavities which we have to excavate, and the driving electrically of a bleaching agent into the dentine for the purpose of bleaching discolored teeth. Those who have had more experience with cataphoric processes than I have will probably be able to send to the committee, of which your humble servant is chairman, and which wants to make a report, some positive information upon these points. I received a telegram a few moments since from Dr. Palmer, who requests me to say in regard to this matter that he had several patients—perhaps five or six—for whom he had used cataphoresis with cocaine to obtund the sensibility of cavities which he was excavating, and in almost every instance—I say almost so as to be on the safe side—the patient complained of subsequent pain. And in one case where I used it myself the patient said, "Well, I do not want that thing any more; as a rule, when I go away from here with a tooth filled that is the last of it, but I have been nearly thirty-six hours now suffering from that tooth which was filled, and I do not like that." If that

experience has been had by others I should be very pleased to know of it. I think we ought to give a fair, just, and impartial examination into the question. I think that is what we are doing in this society; and if any members can give the result of their knowledge in that direction I shall be obliged.

Dr. Davenport.—I might call Dr. Bogue's attention to a short article in the March number of THE INTERNATIONAL DENTAL JOURNAL, from the pen of Dr. Rollins, of Boston, on this subject; and judging from the little Dr. Rollins wrote, I think it might be worth Dr. Bogue's while to ask Dr. Rollins to say more upon the same subject.

Dr. Bogue.—Very much obliged. I will do so.

Adjourned.

S. E. DAVENPORT, D.D.S., M.D.S.,
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AMERICAN ACADEMY OF DENTAL SCIENCE.

THE regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, Wednesday, December 24, 1895, at 6 o'clock. A talk upon Materia Medica was given by Dr. E. C. Briggs, Boston.

(For Dr. Briggs's paper, see page 294.)

DISCUSSION.

Dr. Bradley.—I have noted down one or two things that Dr. Briggs mentioned, and one is the use of bicarbonate of soda. I have used bicarbonate of soda for some time in cases of sensitiveness around the necks of teeth, but in some cases a patient would complain of a very severe pain when the soda was first applied, and so severe was this pain that the remedy was thought to be worse than the disease.

Within a short time a young lady came to me who had very sensitive cavities on the labial surface of the lower teeth, and as it was such a trial for her to have anything done I recommended that for several days she apply bicarbonate of soda to see if this sensitiveness could not be lessened. She tried it, and returned with the remark that she would prefer to have me excavate the cavities as they were rather than apply bicarbonate of soda about

the necks of her teeth. And I would like to ask the essayist if he has met with such cases and how he has dealt with them.

Where there is evidently periostitis, coming on after the filling of a pulpless tooth, I have prescribed a slight cathartic in the first stage, and if there is no beneficial effect from that, I have then prescribed a pill made of one grain of opium and two grains of camphor. I invariably divide the pill and give the patient one-half the quantity to be taken when in bed and prepared to go to sleep; if they are not asleep in one hour they must take the other half of the pill, and I must say that I have had very satisfactory results from the use of this opium and camphor pill. One case in which it worked admirably was that of a young boy, twelve years of age, in whose case it was necessary to devitalize a sixth-year molar. After treating the tooth I filled it, and apparently everything was satisfactory, and he was dismissed. The next day was a wet one and it seemed to strike him as a good day to go fishing. He came home thoroughly wet, with a sore throat as the first symptom, and during the night his tooth began to ache, and by morning a very severe periostitis had developed. I tried to subdue it by external applications, the capsicum plaster, etc., but nothing seemed to relieve him until I gave him this opium and camphor pill. I have not seen him since, but some of the members of the family say that he went to sleep that night and had no further trouble from the tooth.

I shall try the effects of antikamnia in my practice in cases of periostitis which I am unable to subdue by local applications.

Dr. Piper.—There is one product of coal-tar that Dr. Briggs did not refer to which I rather expected and hoped he would mention, and that is ammanol.

I have found it to work where the other sedatives did not seem to do much good. Not long ago I had a case of severe pericementitis, and I gave the patient phenacetin in five-grain doses, which she continued taking every half-hour until twenty grains had been taken, and was not relieved. When I saw her, the next day, she was in bed. I prescribed ammanol in ten-grain doses, and she afterwards told me that she seemed to be relieved almost immediately on taking it, and that the pain left in less than twenty minutes. It is probably phenacetin or acetanilide, combined with ammonia or some stimulant, and seems to be more safe to use than phenacetin alone, and the after-effect is more pleasant.

I have been so much pleased with the action of ammanol that I wish some one else would use it.

Dr. Cooke.—Perhaps Dr. Briggs would like to say something before we pass this subject.

Dr. Briggs.—I don't know that I have anything special to add to what I mentioned at first. In regard to the pain produced by the application of the bicarbonate of soda, spoken of by Dr. Bradley, of course it would not be wise to persist in the use of it; if you find it acts in that way, you have simply to do the best you can with the case as it is presented to you.

This ammanol is a combination of one of the products of coal-tar, all of which have a tendency to depress the circulation, with a stimulant which reduces the liability to danger and makes the drug more effective, and this is the result produced by combining caffeine with acetanilide in antikamnia. Ammonia with phenacetin in ammanol makes another happy combination.

The one point which I would like to emphasize is the improvement which you will be almost certain to attain in your treatment by splitting up your dose. If you know the dose to be a full one, I advise you to split it up, and I think almost all drugs, if a certain dose is what you want to give in twenty-four hours, will work very much better in every way, if you divide it up and spread it over the twenty-four hours in small doses, you do not lose the therapeutic effect and you do lose the toxic effect.

The original nitrous oxide effect was produced by stopping the supply of oxygen,—it was choking a man, so to speak, without preventing the elimination of the CO_2, and for that reason has been claimed to be nothing but asphyxia.

I do not regard that as now tenable. I think that there is a true anæsthesia, and experiment will show that to be the effect. The compound oxygen preparations that are used for general tonic stimulants in cases of dynamic fevers, heart-failures, etc., are, most of them, combinations of nitrous oxide with oxygen, and they can, all of them, I think, be taken with considerable anæsthetic effect. I tried a compound oxygen preparation a very short time ago, and two long breaths made me nearer complete anæsthesia than I have ever been with chloroform in quite a good-sized dose, and more so than I have ever been able to get with bromide of ethyl on myself. I am not a very strong advocate of the bromide of ethyl; I have not found it very reliable. Some patients would go into the anæsthesia very quickly and nicely, while with others I could not seem to manage to obtain a satisfactory degree. That was one of those drugs which fell into discredit because of extraneous circumstances connected with cases in which it was

administered. Two prominent surgeons used it and had a death. Dr. Levis, in Philadelphia, gave it to a patient who had pulmonary trouble, and the patient died; he called it the effect of bromide of ethyl; J. Marion Sims had one of those long, trying operations on the uterus, and the patient died several hours after the operation, and that was attributed to the bromide of ethyl, consequently it was discredited, and has never been very highly regarded by the profession on account of these accidents, which were really no fault of the drug itself. This ought to bring prominently before us the importance of great care in giving a drug for the production of anæsthesia. If you give it in a definite dose as you would any other medicine, there is no reason why one should not get the result which repeated experiments have shown to be the effect of such a dose. You would not expect to throw a gallon of a thing at a man, and that he would absorb just what was good for him and no more. It has been just this carelessness in the matter of the dose of these petroleum compounds that has discredited them: antipyrin was given in twenty-grain doses until injurious effects were reported from several different quarters; but when they reduced the dose it was found to work satisfactorily. Chloral was first used recklessly, and several fatalities resulted before the dose was brought down to what it should be, and so I think that it is better to try a small dose first and perhaps repeat it rather than give a maximum dose and expect that a man will absorb only what is good for him.

I do not know how the society stands on the subject of anæsthesia. We had a controversy a while ago in which the claims of the two aspirants for the honor of its discovery were presented by their friends, but I do not know who established the strongest claim. I thought I would simply state to the society that I know where there is an oil portrait of Dr. Horace Wells, probably the only one in existence. It was painted at the time he was living in Hartford, and I do not know the circumstances, but rather think that the sitting was secured and the picture bought by some friend of the family, and it would seem as though it ought to be in the possession of the society on account of the strong claims that he had to being the discoverer of anæsthesia. I speak of it simply to put it on record that there is such a portrait in existence, and that it can be bought.

Under the head of "Presentation of Specimens," a model of an automatic mallet, which was something of a novelty, was presented by Dr. Belyea. It was really two mallets in one, both ends being

utilized, and, in addition to that, each of the mallets had a direct action and a back action. Of course, the direct action and the back action cannot be used at the same time, but there are times when the back action is much wanted. The chief advantage of the instrument is the time saved in changing points.

WILLIAM H. POTTER, D. M. D.,
Editor American Academy Dental Science.

ACADEMY OF STOMATOLOGY.

A REGULAR meeting of the Academy was held at its rooms, 1733 Chestnut Street, Philadelphia, January 28, 1896.

After the transaction of the usual routine business Dr. E. S. Talbot, of Chicago, read a paper upon the subject, "Pyorrhœa Alveolaris."

(For Dr. Talbot's paper, see page 203.)

DISCUSSION.

Dr. Wm. H. Trueman.—Certain expressions in the short abstract from the paper given reminded me of a paper written by Dr. Hayden upon pyorrhœa alveolaris in the *American Journal of Dental Science*, and I think it is of interest to refer to it. I think it is page 214, March number, 1822. Dr. Koecker wrote a paper reflecting upon Dr. Hayden, asserting that Dr. Hayden did not understand the nature of the disease. That prompted Dr. Hayden to look the matter up very closely in 1822, and the result of his study was published in the *Medical Recorder* of Philadelphia. He gives, I think, the most exhaustive history of the disease I have ever seen, and, reading it over and reading Dr. Talbot's paper, I am quite sure that the two men may, so to speak, be able to shake hands over a chasm of more than seventy years. I am somewhat inclined to think that both of them have come to the same conclusion.

Dr. Talbot states that the disease is increasing. I think that would be the sentiment of every dentist who has been two score years in successful practice; it may be that when a dentist has many patients with the disease, it gives him the impression that it is increasing. I do not think so; neither do I think it is due to dental operations, from the fact that all the old writers speak of it as very prevalent and very destructive to the teeth, so much so

that they termed it devastation of the teeth, and a hundred years ago that expression was about the same as is now applied to pyorrhœa alveolaris.

It is a question with me, in many cases, where the pathological condition begins. In early life sometimes the gum-margins are receding, perfectly healthy in color, and this continues to such an extent that the teeth become loose, and then results a pathological condition due to the loosening of the teeth. I have found that where the teeth were mechanically held firm the pathological conditions subside.

In regard to the gouty diathesis, I have not seen anything to lead me to think it has anything to do with it. I have seen conditions of the mouth indicating strongly marked pyorrhœa, and no other symptoms of uric acid diathesis; in many cases I have put patients under lithia treatment, without noticing any benefit at all. In several cases where patients lead a very sedentary life I have urged a change, and it brought a very marked improvement.

With regard to the cure of the disease, I think there is but one, and that is the forceps. I have never seen a case that has been cured.

As long as the treatment is continued there is improvement; if the treatment is discontinued the disease returns. I have observed that if the teeth are held firm, it aids in effecting a cure. I have tied them with a ligature in many cases, with great improvement, and in a number of cases recently, probably eight or ten, I have drilled holes through them and put in a bar and held them perfectly firm.

I had a case some time ago that was cured spontaneously, without any treatment whatever. A patient had been coming to me for some time, a man about thirty years of age, and finally the trouble reached such a stage that I told him I could do nothing for it, and if any one could, to let him have the opportunity; the teeth were loose above and below, the pus was exuding, and the mouth was in a very unhealthy condition. He had always taken good care of his teeth. I saw him again in a year, and there was the greatest change, and with very little recession of the gums. He had, in the mean time, made no change in his mode of living, and had not been under medical treatment.

There are some cases where, under this condition, the teeth are removed and the roots are perfectly smooth, and in others absorption has gone on, leaving them like needle-points. I would like to know the cause.

Dr. W. G. A. Bonwill.—I read Dr. Talbot's paper before I came here. You all know my treatment in regard to pyorrhœa. Dr. Talbot's paper reaches some points very clearly. I cannot agree with him so far as his treatment is concerned. It is time some of us had learned to treat pyorrhœa. Of the number of teeth he had extracted I find in his essay that fifty per cent. come from his own office. I should judge from this that he had not much success in the treatment of his cases. I can agree with him in one thing, so far as I believe and have seen, and that is his view of the hypothesis in regard to gouty diathesis. I never had occasion to see the etiology of the disease in that light. I do not agree with him that it commences on the gums on the alveolar border, nor that the deposit should be left there. That is a very ultra measure. Even he, I judge, would not like us to think he advocated that. I would not like to think that any man would do it, nor do I care to see a man with good sense recommending anything of the kind.

I agree with him that bad dentistry has done more than almost any other one thing in producing this disease. It is not necessary to state in what way, but he does not tell us what is good dentistry, nor how to cure it by good dentistry. I have no doubt these cases can be cured.

I am a little surprised at the doctor using iodine. In my practice the use of it is almost obsolete.

There are a good many points that may be taken up, but the whole thing has been discussed over and over again, and nobody seems to come down to the fact that pyorrhœa can be cured. I feel that he leaves us just where he found us.

I treat pyorrhœal pockets as fistulas; when you have once done it let nature alone. I treat the case as a surgical one, burn it out. Do your work right, and nature does the balance.

I had a case sent to me by a dentist in Philadelphia. He told the patient he could do no more. Really, there was no trouble in the case, but the dentist had kept him running to his office constantly. He dabbled in it so often, nature had no chance to make a cure. In three treatments, two hours the first time, I went right through the whole thing, burned it out as if I were burning out a cancer; then let him come back in a few weeks; and as there was no further trouble I sent the gentleman back to his dentist with my compliments.

At some future time I shall write up what I have to say on this subject.

Dr. D. D. Smith.—There are points in connection with this

subject which have never been considered, so far as I know, or, if they have, there has not been sufficient emphasis placed upon them. Dr. Talbot touched on some of them to-night, and what he said agreed mainly with my experience in connection with the disease.

In the first place, there is the age of the patient to be taken into consideration. We talk of this disease as if it were, like decay, finding expression in every mouth, in the mouth of the young subject, and in the temporary teeth. Often I have heard it declared it has been found in the temporary teeth, and also in old age.

In my experience it is confined absolutely to middle life, just at the age where we do not want to find it. We do not find it in young subjects. Dr. Talbot's paper speaks of the disease being found in connection with a person fifteen years of age. In a practice of thirty-three years I have failed to find it in a patient as young as this. I do not remember ever seeing it in a case of twenty years of age; possibly I may have. Persons who give expression to this disease are people well along in years,—from twenty-five to forty years.

Another point I failed to notice in his paper is, I have no hesitation in saying, that it is always found in connection with good teeth; teeth exempt from decay. He speaks of the teeth coming out smooth without any deposit on the roots. So they do. We find just that condition of things. But what sort of teeth are they? they are teeth that have never decayed or have ceased to decay; they are teeth without an expression of decay about them. I have never found it associated with poor teeth and teeth liable to decay.

If this is the case it cannot be from uric acid poisoning. It cannot be from irritation of the gums from a local irritant, or a constitutional irritant which expresses itself at the margin of the gum. There must be something else associated with it.

How does this disease attack the teeth? From what we hear from the papers and discussions, we might suppose the disease attacked the teeth anywhere on the roots. Where does it appear? Between the teeth. What else do the teeth do? They turn and twist in their sockets as if there was some irresistible force expelling them outward or inward. There is a force at work on the roots of the teeth which is actually twisting them out of their alveolar sockets. What is it? What does it? Why is it always associated with good teeth? You have all seen a central incisor

attacked. Where? On the mesial portion of the root, twisting that tooth and rotating it in its socket, and you will find in all these cases that there is an opening between the two teeth; in every case a space between the two. The teeth are forced in the direction of the least resistance, whatever that may be. If it is a lateral it is almost always attacked on the distal face, and if it is a central it is almost universally attacked on its mesial face and forced backward. What occasions this? Here in the paper we see nothing of this particular expression of the disease in connection with strong, sound teeth.

In regard to tobacco I have this to say, that while its use is an exceedingly filthy habit, I have never seen any ill effects from chewing tobacco except wearing down the teeth. I frequently recommend my young patients to chew gum. I think it is one of the best things to make good teeth. The essayist speaks about rubber dam being one of the exciting causes. I cannot agree with him. I do not believe rubber dam or regulating appliances ever did such a thing in the world as to excite pyorrhœa. They are almost always in connection with children. I have never found it in connection with young people. I cut off these pyorrhœal teeth and put on bridge-work on purpose to save them, and do it effectually. As to pregnancy, why should it be an exciting cause? Pregnancy is often the cause of decay of the teeth. We always look for it and expect to find it.

While I agree with Dr. Talbot in many respects, I do not agree with him as to the exciting causes. I think the root of the trouble lies in the dental pulp. Investigation on the subject will go to show that the dental pulp is at fault in connection with pyorrhœa, where it exists in its true form, in the solid teeth of mature life. It has made the tooth too solid, it has made it of too good material, and the result is that the pericemental membrane becomes irritated and begins to withdraw itself; and it is just like any other irritant anywhere else, and nature begins to throw it out, and begins at the weakest point. That is why the twisting and turning occurs. What proof have we of this? I do not say it is all the dental pulp, but I believe the dental pulp is at fault. It has overdone its work, it has made the tooth itself a local irritant, and nature is making an effort to throw it out.

In the case of a good, healthy tooth with a devitalized pulp, you will never find pyorrhœa attacking it, no matter even in a mouth where pyorrhœa is running a full and free course; the devitalized tooth will be exempt. Why? Simply because the

cemental structure about the root of the tooth is in its normal condition. There is nothing to interfere with it, and it remains there for the support of that tooth.

I cannot fight pyorrhœa as Dr. Bonwill does, burn it out and let it go; it will not do it for me. In one case I treated a patient for a number of years, and finally drilled into the pulp and destroyed it. That did not bring the tooth back. It remained in that twisted position, and finally I cut it off and put on a crown, and it will take a dentist to know there has been anything done in that mouth. The disease seems to be cured.

Dr. James Truman.—I hardly feel like expressing a word, and I would not do so were it not for the fact that my friend, Dr. Talbot, has come here with a paper that I generally indorse.

It is a gratification to me to listen to it, because I regard it as thoroughly scientific. He has searched for the truth through proper channels. The clinical experiments he made in Chicago confirm my own views that the uric acid theory never had any firm basis as a theory of the etiology of pyorrhœa.

There has been much said on the subject here in Philadelphia. We have all written and spoken on it, and we never will agree. I do not even agree with Dr. Talbot exactly that it begins in the gum-tissue. I fully agree with him that the deposits really have very little to do with it; in fact, you can treat a case of pyorrhœa without removing the deposits. I know that is radical. I am a little surprised to hear Dr. Talbot take that position, but I believe it to be true; that the deposits are simply secondary, and that it has little to do with the progress of the disease. The disease is primarily caused by micro-organisms. That, I think, I settled to my own satisfaction twenty-five years ago in microscopical examinations, and I have never seen any reason to change it. I know very well that in the treatment of this disease you must first attack those pathogenic germs which exist around the gingival border if you expect to have success, and it is astonishing to me to hear a man, who has been in practice as long as my friend William Trueman has, say that nothing but the forceps will relieve this trouble. Where are we? What are we here for as dentists if we cannot do any better than that? Now, as far as I am concerned, I must say that each case can be treated and restored to health, but it must be treated right. I have a tooth in my own mouth which I treated twenty-five years ago for pyorrhœa, and it is there yet, and I know it will remain there as long, probably, as I remain on this planet.

It is an error that it does not appear except in middle life; I have treated some very bad cases at twenty years of age, and successfully.

We will never come to any agreement until we come to a clear understanding of the etiology of the whole matter. I am satisfied with the treatment I adopted, and I gave it to the profession long ago.

Dr. E. T. Darby.—I have listened to Dr. Talbot's paper, and I think he is right, and when I hear Dr. Peirce, I think he is right, and I think they are both right. I do not believe all cases of pyorrhœa are from the same cause. I believe most fully that some cases have their origin below the gingivæ and express themselves in little tumors along the gum-border. That is the incipiency of the disease. I have thought, at times, the inflammation was the result of the density of the roots. I have seen other cases of pyorrhœa such as Dr. Talbot describes when I thought the origin of the disease was at the gingivæ. Therefore I say all cases of pyorrhœa do not start from the same cause.

As to the cure, I occupy a middle position. I believe pyorrhœa, before it has progressed too far, can be cured, substantially, but all cases of pyorrhœa that have come to my hands have required subsequent and constant treatment. I do not think it can be cured in one or ten sittings, either at intervals of six or ten months or ten years. It requires constant and careful attention. But I should be sorry to believe the forceps to be the only remedy we have for many of the cases that come to us.

I cannot agree with Dr. Smith that the disease always arises necessarily on the mesial surface. I have frequently noticed it beginning at the palatal surface. Neither can I agree with him that it is always on the approximal surface in regard to the posterior teeth. I have seen the disease start upon the palatal root more frequently than elsewhere, and that root become perhaps entirely denuded before the disease manifested itself elsewhere around the gingivæ.

Dr. H. H. Burchard.—A full and adequate discussion of Dr. Talbot's paper would be more lengthy than the essay itself, as it involves the long list of disorders known to produce the condition called pyorrhœa alveolaris. I notice one point in his investigations which I had marked out for my next summer's work,—the influence of tabes dorsalis upon disorders of the teeth. I was, however, and am, prepared to look for more extensive trophic changes due to tabes. It would be curious, indeed, were the fifth cranial

nerve to be exempt from degenerative changes in a disorder which involves many of the others. When we have an opportunity to read Dr. Talbot's paper in print and to deliberately examine his data I believe we will find he has contributed some valuable material to the subject of the pathology of gout.

Hearing the discussion of one of the early papers of Professor Peirce upon this subject, it became evident that some of his critics did not pay sufficient attention to the clinical history and morbid anatomy described by him, in which he clearly differentiated between two diseases; the first a pyorrhœa beginning as a marginal gingivitis and accompanied by the deposit of dark, scaly, and hard bodies beneath the gum-margin, this being the starting-point of an inflammatory degeneration of pericementum which eventually caused the loss of the tooth; the second class those which he described as accompanying and due to the gouty diathesis, these having the incipiency of the dental disease at some portion of the pericementum beyond the gum border. I have seen and recorded such cases, one where there was a well-defined calculus formed upon the upper, the apical portion of the pericementum, the membrane beyond the deposit towards the neck of the tooth being intact.

The next case was one in which there was no inflammatory disturbance of the gingivæ, but half-way towards the apices of the roots of two teeth were swellings, inflammatory tumors, which, when incised, showed the roots of the teeth to be denuded of the pericementum and a partial loss of the alveolar walls; these two cases are cited as being distinctive examples of correspondence with the morbid joint anatomy of other parts found accompanying gout. That all persons who are the subjects of the gouty diathesis are not the victims of pyorrhœa or phagedenic pericementitis is no sufficient argument against this special constitutional condition being a predisposing and exciting cause of the dental disease. Many patients who are evidently and markedly gouty never have any inflammatory disturbance of the metatarso-phalangeal articulation. It exhibits itself in the retaining structures, the articulative tissues of the teeth, because this happens to be the weak joint, a *locus minoris resistentiæ.* Why this is a weak joint I have endeavored to explain in papers written for the *Dental Cosmos* and for the Philadelphia County Medical Society, and have as yet found no reason to alter the opinions advanced in those essays; in fact, time and other essays upon this matter confirm the hypothesis advanced.

In regard to the small percentage of cases exhibiting the murexid reaction, Dr. Kirk and myself noted this soon after the publication of Professor Peirce's essay, finding many of the deposits giving alone the reaction of calcium phosphate; however, several of these cases were those of patients markedly gouty, having a family and personal history of gout.

It is unquestionably true that deposits occur upon the lateral aspects of the roots of teeth without detachment of the gum from the necks of the teeth; secondly, it is equally true that inflammatory disturbance and abscess may occur in similar situations, without the pulp of the tooth being dead; several such cases are recorded in the proceedings of this academy.

Teeth may be lost through the progressive molecular loss of their retentive apparatus and not have their roots the seat of deposits. Many cases are recorded which resisted purely local treatment and yet were clearly benefited through the patients' adherence to an anti-gout regimen and by anti-gout therapeusis. As to the pathology involved, I have believed for the past two years the following to furnish a rational explanation. The pericementum, for reasons which I advanced nearly two years ago, becomes in some persons a weak articulative tissue. The blood-vessels supplying it are, owing to causes which underlie the gouty condition itself, the seat of inflammation; through the swelling of the tunica media the lumen of a vessel or of vessels become obstructed, and there is a death of cellular elements dependent upon that vessel for nutrition,—that is, a greater or less area of pericementum dies.

In this area, whether due to some special selective affinity or to an acid reaction of the dead tissues, a deposit of urates occurs. This may receive fresh accretions through subsequent attacks, and, during its presence, a greater or less degree of irritation is kept up and inflammatory degeneration of the tissues about it occurs.

This corresponds closely with the history of a gouty affection in any other part.

For a solution of the pathology involved in the loss of teeth from deposits which are first found just beneath the gum-margin we need look for no constitutional condition as explanatory; local causes furnish a perfectly rational explanation for it; however, I have seen many of these cases which occurred in gouty patients. Given lactic fermentation, which is present in all mouths perhaps, and coagula are formed by the action of dilute lactic acid upon the mucin of the several secretions about the mouth, and the lime-salts

of the saliva are precipitated and entangled in the coagulum, and in any spot where these particles may find lodgement there is a nidus about which will form calculus. Beneath the margin of the gum they act as irritants, the mucous glands have an altered secretion and this reacts upon the soft deposits, altering their chemical and physical structures, a gingivitis supervenes, the gum-tissue swells and is detached from the neck of the tooth, and micro-organisms have a pocket in which to develop. It is not unlikely that the streptococci invading such areas may give rise to phagedæna. In any event the pathology differs from that of the loss of teeth by the gradual encroachment of salivary calculus only in anatomical situation and not in the essence of the process. There is one point in regard to this matter which needs an emphasis, which I endeavored to place upon it in an article in the INTERNATIONAL DENTAL JOURNAL last year, and that is, even though the case be gouty, it is possible that, by the perfect removal of deposits, the securing of surgical rest, and local asepsis, such cases may be cured for the time being, but there is no assurance that the disease will not reappear with the pathological conditions which precede an attack of gout.

No doubt we all agree with Dr. Younger in this matter, that the essential thing is to get rid of the deposits. I have written somewhat extensively upon this subject and have made careful examination of many cases, as to clinical and family history, and I am more and more inclined to adhere to the doctrines I have already advanced, which were promoted mainly by the teachings of Dr. Peirce and later by a paper of Dr. Reese; this essay, however, antedated that of Dr. Peirce's by several years.

In regard to Dr. Talbot's asserted belief that the deposits found in the general class of disorders are unirritating, characterized by pyorrhœa alveolaris, I do not think he will have the concurrent opinion of clinicians in general. His analogy of the exostoses does not hold; the calcic salts deposited in this hypertrophic condition are probably in the form of calcoglobulin; those deposited as precipitates from chemical solution are physically irritating in themselves; besides, even an exostosis is due to irritation, and clinical evidences show it perpetuates the irritation.

Dr. Talbot.—There is one point in regard to pyorrhœa advanced by Dr. Peirce that I do not understand. I cannot understand how, if the disease is constitutional, the deposit will take place on one tooth and on one side of a tooth, and not on the other. I cannot understand why these men who advocate constitutional treatment

are so positive in their local treatment. If it is constitutional, why simply removing it with an instrument and treating it locally for a time? Why that is all that is necessary? If it is constitutional, it must be treated constitutionally. Simply removing the calcic deposit from the root of the tooth does not cure the disease if it is constitutional. That certainly knocks that theory all to pieces.

In regard to the use of iodine, Dr. Bonwill wants to know when I would stop. I know by each particular case when to stop. I did not advocate it in a medical way. With iodine you can make the gum tight around the root, and the pus-germs cannot get in there to start up the trouble again.

In regard to hard teeth, spoken of by Dr. Smith, there is no doubt but that persons with such teeth suffer most from this disease. He says the pulp has something to do with it. The pulp has nothing to do with it. The pulp recedes. The tubuli of the dentine are filled in with secondary material, and the tissues are harder. What becomes of the pericemental membrane? It has lost its office. The membrane has lost its function. Is that reasonable?

When I come to a meeting I try to relate facts; there is no guesswork about it. I state what I know. I thank you for your kindness, and am much obliged to you for your discussion.

Dr. James Truman moved that the thanks of the society be voted to Dr. Talbot. Carried.

Meeting adjourned.

George D. B. Darby,
Secretary.

Editorial.

THE ART OF PROFESSIONAL TEACHING.

The training of the young and the education of the more mature has been a subject of thought for the best minds, both in literary, scientific, and professional circles. Theories have been framed and lectureships established to meet a growing demand for thoroughness in this important matter. In Europe, and especially in Germany where the science and art of education is best understood, this is held to be of so much consequence to the good or ill of the developing mind that pedagogy has become a

necessary part of the educational system. It has not been carried to the same extent in this country, and the unfortunate idea still prevails that any one is capable of teaching provided he or she possesses the necessary knowledge in any given line of work. Upon this mistaken conception the educational process, while good and in some respects superior, has proceeded with varied results until the United States has practically no system as compared with other countries, and no proper organization of methods in training.

This weakness in our school methods is deplored by many who have been able to make some study of more thorough systems, but there seems no immediate prospect of anything better being evolved from the practices of the past and present.

So thoroughly has the idea, that any one can teach, become part of the American thought that any assertion that something else than mere knowledge is required is regarded as largely the production of senile crudities and not a part of the active progressive thought of the age.

While the foregoing remarks apply to the general work of the teacher, it must not be understood that they do not have force in all departments of training. The defective ideas alluded to very naturally extend into every channel of development; in fact, it is not asked in professional circles how does he teach. but what does he know. When a man becomes an applicant for a teacher's position, in Germany, he must prove his ability in that direction. It is not regarded as sufficient that he knows a thing, he must show that he is capable of imparting it.

If this were adopted in the professional schools in this country there would certainly be much gained, and a general advance would be experienced along all lines of professional work.

The mistake is being continually made that men are taken from the ranks and given positions as educators without a particle of experience to guide them. The result is generally a mortification to the pride of the selected aspirant, and a positive injury to the unfortunate students. Occasionally one may be found so gifted by nature as to be able to overcome the absence of systematic training, just as we find, very occasionally, an actor may make a name on the stage who has never worked his way step by step through subordinate positions. As actors are not created solely by this most lengthened process of training, but must have the gift by nature, so teachers cannot be developed through the same method, though they may be improved and rendered of some value by constant practice.

We have been led into this train of thought by the great multiplication of technical schools especially in our profession. The number has grown so rapidly that almost every State in the Union has one or more, and to these constant additions are being made. This rapid multiplication means a demand for professional teachers, and these must perforce be taken from the ranks of practitioners.

Hence colleges are chartered and opened by men whose entire knowledge is based on two or three years of undergraduate experience to which has been added a certain period of practice. The power to impart has never been learned; indeed, in many cases the newly-fledged professor finds difficulty in maintaining his position without loss of self-respect, or, what is of more importance, the loss of confidence of the student.

This elevation of the individual, without previous preparatory work, means always stilted methods, talking over the heads of his auditors, an incapacity to meet the simplest mind among his listeners. The power to work in sympathetic unison with the learner is primarily the important thing required of a teacher, and without this ability the newly-titled professor will exhibit wisdom by retiring, and returning to his former practical vocation.

It is not unusual to find the suddenly elevated man making his first great mistake in the use of ponderous language and technical terms without limit. No greater error can be made than this. The simplest form of expression is always the best, either in writing or speaking, and this is imperatively necessary in teaching.

This fault is not confined to the lecture-room, but has been translated from this locality to the general work of the essayist. Papers are made tedious and very unclear by the overloading with technicalities and coined words, the writers evidently imagining that profundity is in proportion to redundancy of expression and multiplication of sylables.

That which is especially needed, not only in our profession but in all others, is the thorough training of those who aspire to be teachers, and this, in dental work, must begin with the demonstrator. In this position he should be able to show the qualities he possesses and whether they will fit him for enlarged work and heavier responsibilities. The time is past for men to be given the highest positions who are ignorant of the first principles required in the formation of professional character or practical excellence. Whether dental colleges of the future will be regulated according to the system adopted by those well versed in the best traditions of pedagogy, it is certain, if good results are to be attained, those

who aspire to become instructors must serve before they can lead, and wait humbly for that development which only comes, if it comes at all, through an intelligent use of experience.

PERSONAL EXPLANATION.

Our attention has been called to the following paragraph taken from the letter of the New York correspondent of the *Pacific Stomatological Gazette* of March:

> "Much curiosity has arisen regarding the dismissal of Professor Truman from the secretaryship of the University of Pennsylvania. We were told by a Philadelphia professor that he was not given an opportunity to resign."

This, while in the main correct, will doubtless lead to wrong impressions injurious to all parties concerned.

The change in administration in the University brought with it a modification of former methods, which led indirectly to the retirement of Dr. Truman from the position of dean (not secretary) of the department of dentistry. This action had no relation to nor was it any reflection on his work past or present, nor did it affect his position as professor in the University.

DELAYED MATTER.

The pressure for space has, to our regret, forced the holding over of communications in type. Among these has been the report of the "Golden Anniversary" published in this number. We are still obliged to defer other valuable matter.

Bibliography.

Pathologie des Dents et de la Bouche. Par le Dr. Léon Frey, ancien interne des hôpitaux de Paris, Professeur-supp. chargé du cours de Pathologie spéciale à l'École dentaire de Paris. Paris: Librairie, J. B. Baillière et Fils, 1896.

This manual of two hundred and seventy-four pages and thirty-two illustrations covers more of dental pathology than is frequently

found in works of greater pretentions; indeed, for the purpose intended, it is an admirable condensation which might be profitably imitated by those attempting similar publications in this country. With some additions in harmony with the teachings in this part of the world, it would be an excellent work to translate for the use of students.

A History of the Chronic Degenerative Diseases of the Central Nervous System. By Thomas Kirkpatrick Monro, M.A., M.D., Fellow of the Faculty of Physicians and Surgeons of Glasgow, etc. Glasgow: Alexander Macdougal, 68 Mitchell Street, 1895.

This is a series of essays constituting "historical studies of those chronic disorders which depend upon primary degenerative changes in the structure of the central nervous system."

The table of contents will indicate its value to those interested in these special studies. "History of tabes; history of primary spastic paralysis; of ataxic paraplegia; of hereditary ataxy; of progressive muscular atrophy; of bulbar paralysis; of ophthalmoplegia; of the peroneal type of muscular atrophy; of disseminated sclerosis."

As this list indicates, the eighty-seven pages of which this volume is composed covers matters of importance in the study of neurology, and will be of special value to writers who may desire to be correct in preparing the history of the various degenerative diseases upon which the author treats.

Obituary.

RESOLUTIONS OF RESPECT—DR. W. H. DWINELLE.

The rapid years have gathered one more of the great men of our profession to his final rest.

Dr. Wm. H. Dwinelle, whose life we commemorate, and whose death we mourn, was one of the great figures in the early days of our young profession.

He was born in Cazenovia, N. Y., where he died at the homestead on February 13, 1896, seventy-six years of age.

Entering our profession at a time when it was struggling for recognition among the learned professions, he brought to it the influence of a remarkable personality, and through his varied attainments, and by his energy and hopeful confidence he helped, as few others did, to place it upon a secure foundation among the learned and liberal professions of the world.

Fitted for the practice of medicine and surgery, he yet saw in the specialty of dentistry a wider field for the exercise of his peculiar genius, and he entered upon his work with boundless enthusiasm.

This is shown by his numerous inventions, his brilliant operations, and his contributions to the professional literature of his time. It is also warmly attested by the few surviving companions of those early days.

He assisted in the formation of the first dental college, and was instrumental in establishing the *American Journal of Dental Science*, —one of the most dignified and influential journals our profession has produced.

He performed surgical operations in the oral cavity that were the admiration of the general surgeons of the day, and he performed operations upon the teeth that had never been attempted before.

Many examples of his work are still in existence, to testify to his remarkable ingenuity, and to his unusual skill.

A man of warm heart and generous impulses, he freely gave to all who came; his office was always open, and he was ever ready to show his instruments and his methods to any one who desired to learn.

Having practised medicine and surgery before he entered the dental profession, he commanded the confidence of physicians and surgeons, and was thereby able to help, in an unusual degree, to secure recognition for our specialty, and he stood for many years as a bond between the parent profession and its young offspring.

A man of literary tastes, and a devoted lover of art in all its forms, he was able to reflect credit upon our profession at a time when such influences where more needed than at present.

A man of tender sensibilities, he was a genial companion, and his wide sympathies and varied talents made him a great favorite among cultured people.

He was a man of so many gifts that he could have been a poet, an actor, an artist, a sculptor, or a *littérateur*, this wide range of talent made him always an agreeable friend.

Before the bar he would have been a great advocate; in the medical profession he would have been a great physician or a great surgeon. He chose to be a great dentist.

For this we honor his memory, and we think it fitting that this society, once presided over by him, should place on record its appreciation of him while living, and its sorrow for his death.

A. R. Starr,
Wm. Jarvie,
S. G. Perry,
Chairman.

Domestic Correspondence.

LOUISVILLE ODONTOLOGICAL SOCIETY.

Louisville, Ky., April 2, 1896.

To the Editor:

Dear Sir,—At a gathering of the younger members of the dental profession of this city, during the latter part of 1895, it was, after some discussion, considered advisable to form a local society for the encouragement of social and professional advancement. As a result "The Louisville Odontological Society" was inaugurated, and meets the first Saturday of each month.

The interest and benefit from these meetings has been marked from the start. The next meeting will be with Dr. J. H. Harrington, at the Kenton Club, the first Saturday in April.

The following officers were elected: President, Dr. W. E. Grant; Vice-President, Dr. M. M. Eble; Secretary-Treasurer, Dr. C. R. Shacklitle.

C. R. Shacklitle,
Secretary.

AN IMPORTANT CORRECTION.

To the Editor:

In the paper read upon "Plantation of the Teeth," before the Academy of Stomatology of Philadelphia, December 17, 1895, I credited Dr. Cutler with having made, in 1877, the first publication of the alteration of the alveolus to adapt it to the size and form of the tooth to be transplanted. This appears to be an error,

since I have found later that in an article by Dr. Wm. N. Morrison, before the American Dental Association in 1876, and published in its transactions, he described the obliteration of the septum of an inferior second molar to receive the root of a third molar, the roots of which were coalesced. Therefore the credit for reforming the alveolus should be given to Dr. Morrison.

It may be of interest to state that previous to 1876, Dr. Morrison had replanted and transplanted over forty teeth.

LOUIS JACK.

Notes and Comments.[1]

THE USE OF GOLD SOLDER SCRAPS.—Dr. R. E. Sparks, in the *Dominion Dental Journal*, says, "Dealers cannot allow more than two-thirds as much for solder scraps as they charge for, say, eighteen-carat solder. In crown- and bridge-work solder scraps may be made as valuable as new solder.

"Clean all old backings and bits of plate having solder upon them by dropping them into a bath of dilute sulphuric acid and boiling for a few minutes, or leave in the bath overnight. Wash them in clean water. Hammer each piece quite thin and cut into small pieces, and put into a bottle or box for use. They answer every purpose where cusps are to be filled, or any place where bulk of solder is required. To use them, first flow some new solder upon the piece, then add the scrap. The application of heat will flow the solder contained in the scrap and fuse the whole mass together. Should the surface be rough, on account of the insufficiency of the solder contained in the scrap, to cover the bits of plate contained in the same, add more solder."

THE DENTIST'S POSITION.—We quite agree with Dr. Welch where he says, "A dignified bearing is respected, but too much familiarity is contemptible; genuine sympathy is endearing, but officious intermeddling is resented.

[1] The assistant editor solicits contributions for this department,—new methods, new remedies and formulas, or any short practical note which may prove of value to the practitioner or student. Address 1718 Walnut Street, Philadelphia.

"It requires greater wisdom to know our place and keep it, before our patients, than to preside at a public gathering; it shows greater discretion to say the right thing at the right time, in the right way, under ordinary circumstances, than to be eloquent before an enthusiastic audience; it is better to do the common duties of the hour well than to do some great thing out of time and out of place. It should therefore be our ambition to be in our proper place, doing our work with faithfulness and fidelity."

Removal of Blood-Spots.—Dr. J. E. Woodward says that the removal of blood-spots on the clothing can be promptly accomplished by the application of pyrozone.

Finishing Cement Fillings.—"Instead of paraffin, which scales off as soon as wet, melt together rosin and wax on a spatula, and pour on cement filling after it has stood a few minutes. After a day or two it will take a polish about like ivory."—Dr. E. T. Darby.

Trichloracetic Acid in Cleaning Teeth.—A two-per-cent. aqueous solution of trichloracetic acid to moisten pumice, Dr. W. H. Jones writes, is perfectly harmless. He states further that he has used it in his practice for some time, and finds it far superior to iodine tincture for removing the "green stain" on children's teeth.

Fundamental Requisites to Secure Professional Success.—In speaking of the management of dental practice, Dr. Louis Jack very truly says that without the combination of professional training, general intelligence, moral rectitude, courtesy of manner, and personal neatness, there is little probability of any one securing a practice which would require methodical control. These elements are all so essential that at any stage of practice the loss of any of the several may impair the career of any one.

A Hint to Dental Students.—In the dental college class, it is safe to predict that the successful man in after life will be the student who is studious, courteous, and gentlemanly. Those who are only desirous of obtaining their degree, who are ill behaved and

unkempt, whether in the lecture-room or infirmary, will be the ones who will bewail the lack of patronage, and find that they do not fill the measure necessary to success.—*Western Dental Journal.*

Religion of the Body.—Mr. Andrew Clark, the eminent physician, in a recent lecture at Birmingham on the "Religion of the Body," in which he spoke of the body as a talent which must be put to the highest possible uses, and emphasized the necessity of obedience to the laws of physical health, used the phrase "physical righteousness,"—a capital phrase, which ought to be written on the minds of all Americans. Physical righteousness means obedience to the laws of health; means, among other things, exercise, rest, and the avoidance of overwork. There are many persons who are morally righteous and physically unrighteous. This kind of unrighteousness has been one of our national sins.—*The Outlook.*

The Open Mind.—A recent writer in *The Outlook* says that one of the most discouraging features in a political campaign is the fact that no sooner do most men begin to discuss politics than they betray such absolute rigidity of conviction that discussion is profitless.

This tendency is not confined to political questions. Open-mindedness is one of the very highest and rarest qualities in every walk of life. Nothing is more erroneous than the impression that in order to be strong one must be a partisan in everything that concerns his life. Open-mindedness is a willingness to learn from events; not to accept as a finality any statement of a great question, or position on a discussion. Truth, of course, is eternal, but the expressions of truth in declaration and in institutions are always changing, and he who would live by the truth must keep himself open to its new revelations. No fate is sadder than to become stationary in a world which is moving on into new and growing times and demanding growing men.

Current News.

THE GOLDEN ANNIVERSARY.

The dentists of Philadelphia and vicinity met at the Continental Hotel on December 16, 1895, to celebrate with a banquet, the fiftieth anniversary of the formation of the first dental society, and the first successful movement for the promotion of dental education in Pennsylvania.

Professor James Truman presided, while on his left sat the venerable Dr. Spencer Roberts, who is one of the three surviving original members of that association.

The banquet was prepared and served in excellent style, and at its close the president, calling to order, briefly alluded to the reasons that induced the profession in Philadelphia to celebrate this occasion, and called upon Dr. William H. Trueman, who gave an historical sketch of the formation of the original society, "The Pennsylvania Association of Dental Surgeons," in which he said that just fifty years ago, on December 16, 1845, that society met for the first time as an organized body, in the lecture-room of the Philadelphia Museum, a building that occupied about the spot where they were then assembled. This Association was established for a specific purpose; it was the outcome of an earnest desire of the progressive dentists of Philadelphia to establish in this city a dental college, having a strong State dental society at its back, and they were impressed that it would be more in touch with the profession and its possible usefulness thereby increased.

For several years these matters have been talked of at social gatherings, prominent in which were Drs. John DeHaven White, Elisha Townsend, E. B. Gardette, Samuel L. Mintzer, Lewis Roper, Robert Arthur, and others.

The Pennsylvania Association of Dental Surgeons held its first meeting with the following officers: President, Dr. Gustavus A. Plantou; Vice-President, Dr. Stephen T. Beale; Recording Secretary, Dr. C. C. Williams; Corresponding Secretary, Dr. Robert Arthur; Treasurer, Dr. F. Reinstein.

Referring to this Association, the "History of Oral and Dental Science in America" has this to say, "This was the first organization which did not, almost immediately upon its formation, express

its reprobation of amalgam ; in fact, its whole constitution and by-laws breathe a spirit of tolerance and primal regard for the science over any outside issues, which is in some contrast to its predecessors in existence. It has probably done more real work, quietly and without ostentation, than any other dental society."

The speaker then said that after the society was fully organized renewed efforts were made to establish a college. In this, however, unlooked for opposition was encountered, so that it was not until October, 1852, that the long-wished-for, long-hoped-for dental college was opened by Dr. Elisha Townsend, who delivered the introductory lecture.

Dr. Trueman then gave a brief history of the profession, and closed by saying that the gathering in pleasant harmony of the dental societies and the colleges of Philadelphia at this festive board was to honor the memory of those who fifty years ago did for us so much, and did it so well.

Professor C. N. Peirce was then called upon, and he spoke at some length upon the establishment of systematic dental education in Philadelphia. The early struggles of the few earnest and courageous men were reviewed. How the charter for the Pennsylvania College of Dental Surgery was secured, the college starting in a small way, occupying the upper stories of the building on Arch Street near Sixth, then known as the Jones, White & McCurdy building, the predecessors of the S. S. White Dental Manufacturing Company. From this they moved to Tenth and Arch Streets, and some years later, as the demands increased, to a larger building at Twelfth and Filbert Streets, and three years ago the faculty was again forced to look for larger accommodations. They then built and removed to their new building, northeast corner of Eleventh and Clinton Streets, below Spruce Street. The first faculty of this institution was composed of Elisha Townsend, Robert Arthur, J. F. B. Flagg, Eli Parry, and Thomas L. Buckingham. A remarkable array of talent for that stage of dental education.

The Pennsylvania College of Dental Surgery, from the time of its organization to the present, the close of the last session, has conferred the degree of Doctor of Dental Surgery upon eighteen hundred and twenty-five students, sixty of whom have been women.

The president then called upon Professor S. H. Guilford, who gave a review of the establishment and growth of the Philadelphia Dental College. He spoke especially and with much feeling of the services and life of its late dean, Professor James E. Garretson. This speaker was followed by Professor Edwin T. Darby, who gave,

in a few well-chosen words, an historical sketch of the birth, growth, and present position in the dental world, of the dental department of the University of Pennsylvania.

Among the others who spoke were Dr. Charles F. Bonsall, the present president of the Association, and Dr. Jesse C. Green, of West Chester, who gave a number of his interesting reminiscences. Dr. J. D. Thomas then favored the assemblage with a well-rendered vocal selection.

There was no address of the evening listened to with more appreciative attention than that of Professor Wilbur F. Litch, who was introduced as the editor of that monumental work,—one of the greatest landmarks in dental education,—"The American System of Dentistry." He said, in part, "In listening, as I have, with absorbing interest to the history of this organization and to the reminiscences connected therewith, I have been impressed with the thought that as all social organizations are made up of members drawn together by some common bond of comradeship, some special tie, either of taste, of interest, or of vocation, each organized body takes its individuality from the dominant qualities of those who frame it, and each may be regarded as a composite of its members, a composite which represents character.

"Character to the social organizer is what the soil is to the seed, it determines development, growth, fruitage.

"Many of those who organized this Association I knew personally, and knowing them can realize how much of force and earnestness and zeal and fidelity and courage there was back of the movement in which their hearts were enlisted, and to which they gave so much of the best effort of their lives. There was character back of the Association, and that is why it has lived and why, once formed, it became a social factor as well as an educational power.

"As a social factor, how much it must have accomplished in quieting antagonism, harmonizing misunderstandings, and overcoming prejudices. The younger generation of dentists can hardly realize to what extent jealousy and mistrust obtained among those who had few if any opportunities of really meeting upon common ground, of gauging the worth and merit each of the other. It is difficult to overestimate the value of such organizations in unifying professional sentiment, the first and essential step to true professional advancement.

"There are to-day in Philadephia, in addition to several dental societies, three large educational institutions, while throughout the land similar organizations have multiplied.

"What the achievements of the past half-century have been all know; still greater results may be looked for in the next century so soon to open. To-night we turn a retrospective gaze in the fifty years of honor and usefulness through which the Pennsylvania Association of Dental Surgeons has lived. In honor and usefulness may she still live when a century hence the breath of that newer cycle shall fan the brows of those who, following us, shall then meet to do her honor."

The festivities were then closed by the president, who alluded to the gratification that this celebration had afforded him, and in the retrospective glance given, let us not forget, as we separate, to also labor for the future with the hope that the incoming century would show a far larger and broader development.

G. W. W.

AMERICAN MEDICAL ASSOCIATION.

PROGRAMME FOR THE DENTAL AND ORAL SECTION.

"Chairman's Address." Dr. R. R. Andrews, Cambridge, Mass.

"A Few Causes of Failures in the Dental and Medical Professions."
Dr. B. B. Smith, Pensacola, Fla.

"Modern Methods of treating the Antrum of Highmore."
Dr. W. Xavier Sudduth, Chicago, Ill.

"Further Investigations upon the Antrum."
Dr. M. H. Fletcher, Cincinnati, Ohio.

"Cataphoresis." Dr. H. W. Gillett, Newport, R. I.

"The Technique and Pathology of the Peridental Membrane."
Dr. V. A. Latham, Chicago, Ill.

"Movements of the Mandibular Condyles and Dental Articulation."
Dr. W. E. Walker, Pass Christian, Miss.

"Disease of the Oral Cavity—a Patent Factor of General Disease."
Dr. S. W. Foster, Atlanta, Ga.

"Treatment of Children during the Period of Dentition."
Dr. H. H. Johnson, Macon, Ga.

"Professional Congeniality." Dr. H. D. Wilson, Bainbridge, Ga.

"The Replacement of the Superior Maxilla by a Mechanical Appliance."
Dr. Thomas P. Hinman, Atlanta, Ga.

"Practical Illustrations in Conservative Surgery."
Dr. G. Lenox Curtis, New York City.

Title not yet received. Dr. G. V. I. Brown, Duluth, Minn.

"Pyorrhœa Alveolaris. Dr. E. S. Talbot, Chicago, Ill.

LOUISIANA STATE DENTAL SOCIETY.

The following list comprises the recently-elected officers of the Louisiana State Dental Society, and that of the officers and members of the Board of Dental Examiners:

President, Dr. J. H. Landry, Plaquemine, Iberville Parish, La.; First Vice-President, Dr. R. L. Zelinka; Second Vice-President, Dr. M. W. Rainold; Recording Secretary, Dr. C. V. Vignes; Corresponding Secretary, Dr. S. J. Bourgeois, Morgan City; Treasurer, Dr. L. D. Archinard.

Executive Committee.—Dr. J. J. Sarrazin, chairman, 828 Canal Street, New Orleans; Dr. C. Mermilliod, Sr., Dr. John W. Adams, Dr. C. Ratsburg, Dr. A. J. Foret; Secretary, Dr. Wallace Wood, 621 Canal Street, New Orleans.

Board of Dental Examiners.—President, Dr. A. G. Friedrichs, 641 St. Charles Street, New Orleans; Dr. M. R. Fisher, Dr. J. M. Comegys, Dr. L. D. Archinard; Secretary, Dr. J. Paul Bayon, 643 Bourbon Street, New Orleans.

Special Fund Committee.—Dr. A. L. Plough, chairman, 1039 Canal Street, New Orleans; Dr. J. J. Sarrazin; Treasurer, Dr. C. V. Vignes, cor. Canal and Bourbon Streets, New Orleans.

The Society will hold its next meeting in New Orleans, La., on the 3d of March, 1897, the day following Mardi Gras.

C. V. Vignes,
Secretary.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The Twenty-eighth Annual meeting of the above Society will be held in Geological Hall, Albany, on the 13th and 14th of May, 1896, to which the profession is invited.

The following is the programme:

PROGRAMME.

"Pyorrhœa Alveolaris,—Its Causation, Diagnosis, and Treatment." C. N. Peirce, D.D.S., Philadelphia.

"Professional Fees." S. G. Perry, D.D.S., New York.

"The Application of Medicaments in Pathological Conditions of the Oral Cavity." M. W. Foster, M.D., D.D.S., Baltimore.

"The Latest Achievement in Dental Art." R. Ottolengui, M.D.S., New York.

"Report of Committee on Practice." M. L. Rhein, M.D., D.D.S., New York.

H. J. Burkhart, *President.*

Buffalo. Charles S. Butler, *Secretary.*

NEW ORLEANS ACADEMY OF STOMATOLOGY.

The following-named officers were elected by the New Orleans Academy of Stomatology for the ensuing year:

President, Dr. Louis D. Archinard; Vice-President, Dr. Mozart W. Rainold; Secretary and Treasurer, Dr. C. V. Vignes.

The Academy meets on the fourth Wednesday of each month.

C. V. Vignes,
Secretary.

Selections.

PARACHLOROPHENOL.

Parachlorophenol is a new antiseptic introduced by Nencki, and described therapeutically by Professor Girard, of Bern, in *Revue Médicale de la Suisse Romane* (July 20, 1895). The product occurs in crystalline form, is readily soluble in alcohol or ether, but nearly insoluble in water (only up to one and three-tenths per cent.). Its bactericidal effect on anthrax spores has been verified by Karpow, of Dorpat; its two-per-cent. solution is only slightly weaker than a one to one thousand sublimate solution, but considerably stronger than a five-per-cent. phenol or cresol solution.

Girard records his use of parachlorophenol in nearly two hundred cases. The one-per-cent. solution had a favorable effect on fresh wounds (two per cent. seemed much more irritating), and in no case did irrigation, even of large cavities (goitre, etc.), lead to toxic symptoms; it sterilizes instruments without affecting them; and it is less irritating to the skin than either sublimate or phenol. Girard states that he prefers parachlorophenol to solveol and lysol because of its more exact chemical composition.—*Notes on New Remedies.*

DISINFECTANTS.

The diluting of disinfectants with alcohol, glycerin, and oil makes them ineffectual. Dr. Lenti, of the Hygienic Institute of Naples, has found that corrosive sublimate dissolved in alcohol has proved useless; even in one to two hundred and fifty solution on spores

which were placed in solution for forty-eight hours, their virulence was only weakened. By adding ten per cent. water to the alcohol the germs were destroyed in a one to one thousand solution. A two-per-cent. solution of corrosive sublimate in pure glycerin was useless even after subjecting the spore to it for four days. By adding forty per cent. water they were destroyed in a solution of two to one thousand in twenty-four hours. A ten-per-cent. solution of carbolic acid in alcohol is useless, and remains so even up to fifty per cent. By adding eighty per cent. water the germs were destroyed in forty-eight hours. A ten-per-cent. solution of carbolic acid in glycerin proved ineffectual even after seventy-two hours; ten per cent. water added did not change it; but after eighty per cent. water was added it destroyed the germs in forty-eight hours. A twenty-per-cent. solution of carbolic acid in oil, and a ten-per-cent. solution of lysol in oil, are both useless.—*Zahntechniche Reform.*

A NEW HÆMOSTATIC.

In the *Lyon Médical* for February 17 there is an abstract of an article which appeared in the *Therapeutische Wochenschrift* for January 6, in which the author, Dr. Hederich, of Heidelberg, recommends a new hæmostatic called ferripyrine. This substance is a definite combination of iron perchloride and antipyrine, under the form of a reddish orange-colored powder which is easily soluble in cold water. It has several appreciable advantages over iron perchloride, and has neither its caustic qualities nor its bad taste; its hæmostatic properties are, moreover, superior to those of the perchloride. In a case of profuse hemorrhage caused by a very vascular myxoma of the nasal cavity, the application of two tampons saturated with a twenty-per-cent. solution of ferripyrine was sufficient to arrest the flow of blood completely. It may also be employed internally in doses of eight grains. Dr. Hederich thinks that it should be tried in cases of blennorrhagia in injections of one-per-cent. or one-and-one-half-per-cent. solution.—*New York Medical Journal.*

THE

International Dental Journal.

Vol. XVII. June, 1896. No. 6.

Original Communications.[1]

ELECTRICAL OSMOSIS IN THE TREATMENT OF ACUTE DENTINAL SENSIBILITY.

BY LOUIS JACK, D.D.S.

In the application of electrical osmosis for obtunding dentinal sensibility I have had the experience of a variety of cases in the past three weeks.

The effect of cocaine so administered is marvellous. In every instance of the most extreme sensibility where I have used it in this manner the result has been profound. In most cases the obtundation was absolute,—in some after the caries had been removed and considerable progress made towards the retentive formation, a normal degree of sensation appeared.

The apparatus I have used is the No. 11 of the Chloride of Silver Dry Cell Battery Company. This form contains in one case any desired number of cells up to fifty, a milammeter with three scales, a cell selector, and a controller, with the usual cut-offs, and the ordinary medical electrodes.

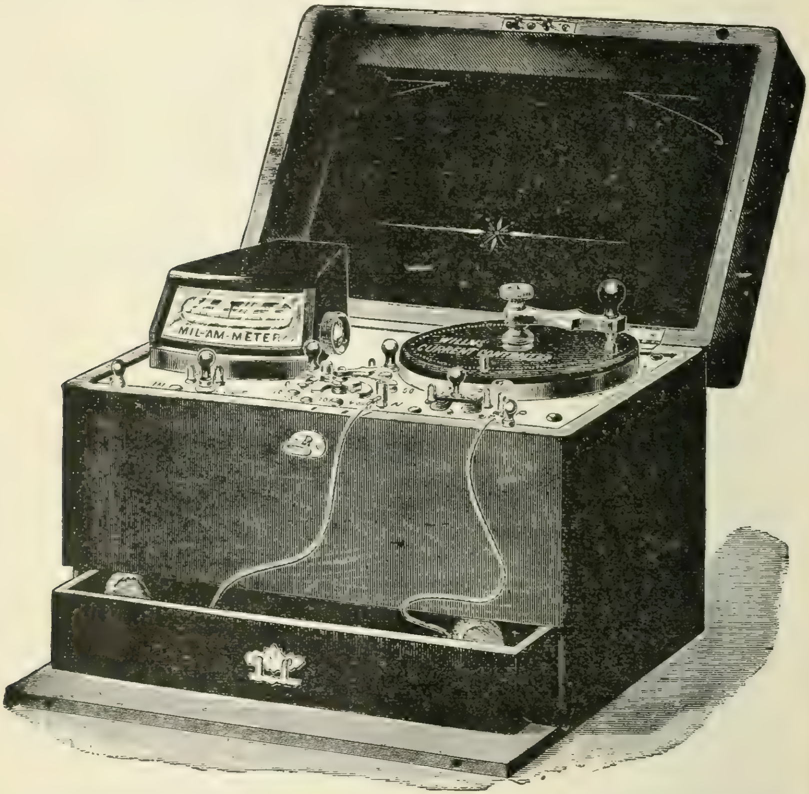
Fig. 1 shows this apparatus as adapted to medical purposes. For dental use the drawer is not required. The reduction of the height of the case by excluding the drawer makes it more convenient and in better proportion.

I was induced to select this apparatus for the reason that it

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

is well known that the chloride of silver cell is the kind best adapted to medical purposes as having an agreeable ratio between the voltage and the ampèrage, the voltage of each cell being one and the ampèrage between one-fifth and one-fourth. It is always constant, which means that there is no polarization, and that it does not

FIG. 1.



decline in power until nearly exhausted. They emit no fumes and there is no "creeping" of the electrolyte to interfere with the action. Moreover the cells are "dry."

The controller is the most important adjunct of this apparatus. It is stated that its highest resistance is ninety thousand ohms. On its surface are one hundred and twelve contact pins which may be put in the circuit. From the first to the last the gradation of the reducing resistance as the switch is advanced is extremely regular. This permits the current in ampèrage to be slowly increased as the indications permit. The initial voltage is determined by the number

of cells selected. Some cases requiring only ten or fifteen cells, others twenty. In only two instances have I used twenty-five. The difference in the number of cells required appears to depend upon the varying resistance of the tooth being operated upon. Ten cells are sufficient for children, and for teeth apparently soft. More than fifteen cells become necessary for adults where the dentine is dense.

Fig. 2.

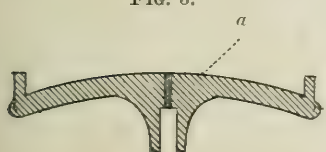
Storage cells, as stated by Dr. Brown in the April number of the International Dental Journal, used with the Willms controller,—which is the same as the one above mentioned,—would be equally constant, but the ratio of ampèrage to the voltage of each cell should be nearly the same as above indicated. This would be nearly satisfied by type B of the "chloride accumulator" having three plates three inches by three inches to each cell, normal charge rate five-eighths of an ampère. Discharge in ampères for eight hours, five-eighths. This would equal six hundred milliampère hours. As the rate of discharge during electrical osmosis is not usually greater than three milliampères of current, this should theoretically permit eight hundred applications of fifteen minutes each. Of storage cells twelve would be required. The only question concerning this source of force is the embarrassment connected with charging.

As to the application of cocaine and of the electrodes, I follow the methods stated by Dr. Gillette in his articles.

Fig. 2 represents the anodal electrode with its platinum point. This instrument is jointed at *a* by screw connections to enable the handles to receive various sizes and shapes of points. The battery cords fit the socket at the distal end.

The cathodal electrode is represented in section by Fig. 3. The surface *a* is a plate covered with platinum-foil to prevent oxidation. The connection is made with the cords in the usual manner on the reverse side. This form is adapted to be held in contact with the face by the projection on the reverse side passing through an opening in the band which supports the rubber dam. It can also be held by the finger.

Fig. 3.



In use the recess is filled with a disk of amadou (spunk) or of thick blotting paper, which is first wetted with a solution of sodium chloride. The usual sponge electrodes soon become disagreeable, and, further, it is more cleanly to use a fresh disk for each person.

As to the placement of the cathodal electrode it has appeared better to put it on the cheek for the upper teeth and on the neck for the lower; in each case it is placed near the ear. I have not observed reddening of the skin which some have noticed. Should the person have much adipose tissue on the face which much increases the resistance, it is better to have this electrode held in the hand.

When the electrodes are placed the switch of the controller is very slowly advanced until the movement of the eyelid indicates slight, irritation of the tooth. This is to be distinguished from the first impact of the current, as even at ten cells the first contact pin is felt notwithstanding the high resistance of the controller, but after this is passed the switch may be carried on the circle nearly forty-five degrees before indication of irritation appears. As the sensation passes off, the switch is slowly advanced a pin at a time and so continued until by a more rapid lessening of the resistance no irritation appears. Usually at this point in the administration nearly all the resistance may be taken off. If this can be done it is conclusive that relief has been attained. The switch is then carried back to zero when the electrodes are removed.

Since I have been using this means it has not failed in a single instance to overcome the sensibility so as to permit the complete removal of the caries and the preparation of the cavity. In some instances normal sensibility of healthy dentine is observed in the preparation of the margins during the formation of the retaining grooves. When this is the case it is usually found at the margin towards the occlusal aspect. When we reflect that as the remedy is carried on a line somewhat coincident with the direction of the current, and as the course of the current is from the broad surface of the cavity towards the apex of the tooth it is to be expected that the parts most affected are those in the course of the current. It is apparently for these reasons that the effect is the most pronounced on the bottom and cervix of shallow cavities.

There is another important and interesting consideration connected with the effect of the current which requires close and continued observation. After a few moments of the application a sensation is produced in the tooth which is often compared by the patient with the effect of subjecting the tooth to changes of tem-

perature. When it is considered that the resistance of the teeth, on account of their density and composition, is high, as is shown by the great disparity between the ampèrage of the current tested when at short circuit and as shown by the milammeter when the tooth is included in the circuit, it is indicated that this sensation is brought about by some elevation of the temperature of the tooth, caused by its electrical resistance. This rise of temperature is probably modified by the evaporation taking place from the aqueous solution in the cavity.

The period required to produce the effect has usually been about twelve minutes, in some instances in clinical experiments, when the conditions were extreme, the continuance has been greater.

As to the cocaine solution I prefer sixteen to twenty-four per cent. The cocaine hydrochloride pellets of Wyeth Brothers, which are everywhere procurable, contain one and one-fifth grains. One of these to five minims of water gives twenty-four per cent., to seven and one-half minims sixteen per cent., to ten minims twelve per cent. The graduated minim measures are a most convenient vessel to make the solution in.

After repeated trials I have come to consider cocaine citrate as superior to the hydrochloride; the former being efficient in dense tissue when the effect of the latter has not been complete. The citrate is at present procurable of Merck & Co., of New York.

Note.—For the recent literature of this subject, see "The International System of Electro-Therapeutics," Section C, pp. 1 to 20. *Dental Cosmos*, June 1895, and March 1896, p. 210, *et seq.* International Dental Journal, February and April, 1896. "Proceedings of the American Dental Association for 1895."

ON "LIGHT."[1]

BY MYLES STANDISH, M.D., BOSTON, MASS.

Mr. President and Gentlemen,—When I received the notice stating that I was to read a paper, I felt that I was sailing under false colors, as I had made no preparations to read a paper, and had no time in which to prepare one. I hardly knew what to do, but decided to come and say a few practical words which may be of interest to you.

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[1] Read before the American Academy of Dental Science, January 1, 1896.

I do not intend to talk on "light" from a scientific point of view, nor do I propose to enter into the mathematics or chemistry of the subject,—I am simply prepared to talk on it as it most directly and practically interests us, and purely from a clinical point of view, as the subject presents itself to the oculist rather than to the scientist.

By light we mean the light that we all use in our work day and night, and I will begin with artificial light. Let me bring to your mind two or three small facts in regard to the physiology of the eye. You will recall the statement which you heard when at school, that "the eye is a photographic camera." As you were then told, the retina serves as a sensitive plate and literally makes a picture every time we look at anything, and then with inconceivable rapidity the picture is dissolved when we look somewhere else. This is made possible through the peculiar functional action of a fluid called the "retinal purple." Not very much is known about the process, except that, in some mysterious manner, there is deposited in the retina a photographic picture in this purple, which purple soon becomes exhausted and new purple is created for the next picture. There is a limit, however, to the creation of this purple, a fact very easily shown in the condition known as "snow-blindness." If you have ever read of men who have been walking over fields or prairies, especially in the colder climates, where they are sometimes compelled to walk on the snow for weeks or months at a time, you have learned that they have been afflicted with a red-blindness,—that is, everything after a while began to look red, and at night when the sun went down, or when it became cloudy, they were unable to see at all. This redness is due to this: that so much light has come in through the pupil that the retinal purple is completely exhausted, and if you go on long enough under such circumstances you destroy the eye. Now, here is an important fact with regard to the chemistry of light: that this retinal purple, under ordinary circumstances, is being replaced as fast as exhausted, unless, of course, it is taxed entirely beyond its powers. We have certain habits and methods of using our eyes, and it is easy to see that the lower parts of the eye are more used to receiving light than the parts that are above. The brows protect the eye from the light coming from above, but we have no such protection from the light coming from below, and we, therefore, experience great inconvenience from the reflection of the sun shining upon the water or upon a field of snow. I had a chance to demonstrate this to my satisfaction at one time when I went up to the White Mountains on a vacation in the mid-

dle of winter. I took up with me a variety of dark glasses for the purpose of trying their effect, and walking across the fields one morning, which were absolutely white with a few inches of newly-fallen snow, I tried these various glasses. I found the smoked glasses the most comfortable, the blue next, and the green the least. I then remembered a conversation I had had with Professor Goodale, the botanist, at Cambridge, in which he told me of his experience in some country, New Zealand, I think, where they went over a glacial formation or a white stony formation, or something of that sort, which was very white, and the Indian guides told them to blacken their cheeks and lower eyelids, and the light would not hurt them. They did this, and they found that the reflection of the light from the white surface did not affect them. Now, I could not see why blackening the cheeks had anything to do with the eye, but I went back to the hotel and blackened my under eyelids, and found that I could walk across the snow-field and keep my eyes open just as well as if I had on a pair of smoked glasses. Thinking that perhaps I had gotten used to the snow, I went back again and wiped off the burnt cork and found that the snow was trying just as it was in the first place, and I then came to the conclusion that the reason the light hurt me was because it came from the wrong direction. I relate this to you simply to show that the effect of light on the visual purple is greater under unaccustomed conditions.

Until quite recently, I do not know but always, the oculist has said that artificial light required three qualities,—steadiness, proper color, and intensity. And I think that most oculists, and almost everybody else, felt that the last quality was the most important of the three. When I found I was announced to come here and talk on this subject, I thought I would see what the authorities had to say on the subject of the effect of light upon the eyes, and I looked through the text-books on physiology, the ophthalmological text-books, and a fairly extensive library of books of reference, including the "Encyclopædia Britannica," to see if I could find something that I could use, but I could find nothing bearing directly on this subject, and, therefore, I was obliged to get my matter out of my own head, the result of my clinical experience in taking care of the eyes of people who complain.

Within a short time we have had introduced the arc light, the incandescent electric light, and the incandescent gas light. The arc light came first, and it was hailed with great delight for the lighting of our streets, and has since been used in the large retail dry-goods and other stores; but they soon found that in the stores

it played great mischief with the eyes of the employés. We then said it was due to its brilliancy. Well, I think it was, to a certain extent, but to a greater extent this was due to its variability; it would go up and down and sputter, and it was this unsteadiness that caused the poor clerks to suffer so intensely with their eyes. And they are not the only ones who are injured from this inconvenience. I think it is a most outrageous thing that we should permit in our streets these electric arc lights to be hung almost directly in front of the eyes of the people as they walk along. When they are put up on a high pole, twenty to thirty feet above the ground, it is not so bad, but when you come to place them in front of a shop-window, not more than three or four feet above your head as you walk along, I say it is an injury to everybody that walks upon the street at night. If you walk up Washington Street, say as far as Dover, just as they are turning on the lights for the night, they usually do this before it gets very dark, you will find that although these lights are plentifully sprinkled along in front of the show-windows, when first turned on you do not notice them very much. If, however, you take the same walk about eight o'clock in the evening, you will find that the lights which you did not notice earlier will be boring into your eyes; they will trouble you, and if you have sensitive eyes, they will harm you. Now, the intensity of that light was just as great at four or five o'clock as it was after dark, and, of course, the intensity is greater than that of daylight, and yet we did not notice the lights at all until we came upon them and perhaps heard them sputter, and why not? My explanation is that our eyes, in the first instance, were adapted to receiving much light and the intensity of the electric light was not noticed, but after dark when our eyes were adjusted to the darkness and the brilliant light suddenly came before us, the effect on the visual purple and other percipient apparatus was very injurious.

But, passing by the arc lights, which do not concern us very much in our present discussion, because we do not have to use them in our work, we come to the incandescent lights. When the incandescent electric light was first introduced, it was regarded by oculists everywhere as a great, good thing. You had a light which met all the requirements,—it was steady, it was clear, and it had great brilliancy, and, therefore, it must be a fine light to work by. And I remember that for many years I recommended it as being the best light, and when people came in and told me that it was not, I thought they must certainly be wrong, because the incandes-

cent light was steady and had great power, and I was convinced that the people did not know what they were talking about. But it occasionally happens that our patients do know something about the cause of their complaints and sometimes more than we know ourselves. After I had had numerous complaints from book-keepers and others employed in offices and manufacturing places where they used the electric light, I came to the conclusion that perhaps the light really did hurt their eyes, and I started to investigate. The first case that brought this matter seriously to my attention was that of a girl, whom I saw at the infirmary. She said that she had been employed at the Mechanics Building during the fair, and had worked at a table on which an incandescent light was placed, and there she worked for two or three months with this light always in the same position, and she said that she was sure the trouble with her eyes was the result of the light. I did not say much, though it was plainly evident that something had badly affected the deeper-seated coatings of the eye, to the extent that she had practically lost the sight of it. My next case was that of a young man, who was employed in a broker's office to write down the stock quotations. You know they have a big black-board with the names of the various stocks on it, and the duties of this young man were to look at the "ticker" and mark the numbers showing the rise and fall of stocks on the black-board. This board was in a dark corner of the office and an incandescent light hung directly before him, so that all day long he was standing in a definite position and the light fell on a definite spot of his eye, and the result was choroiditis, and he lost the sight of his eye.

The cases began to multiply in which patients complained of the incandescent electric light, and I began to think perhaps it was not so good a light as it might be, and I started out to find out what I could about it. The first place I visited was the composing-room of one of our great metropolitan newspapers in which they had incandescent lights. In some way I had become the fashion in that composing-room, having had fifteen or sixteen patients in succession, and on inquiring about the lights that were used they said it was the incandescent electric, and I said that I thought that ought to be the best light they could have, but they replied that I ought to come down about the middle of the evening when everything was turned on and see what I thought of them. I went down and instantly saw that the incandescent electric light did not always have at least one of the qualities that I thought it had,—that is, steadiness. It seems that this newspaper company had put in an

electric plant of their own, and in order to lighten the cost to themselves had let to their neighbors lights or power, or both, and they had run their dynamo for all it was worth. Their machine was overloaded, with the result that the lights were constantly going up and down, and I decided that it was not the light but the flickering condition that made all the mischief there. By and by I had another case of inflammation in the eye, caused by the incandescent electric light. This was a man who had a desk in a dark office, and he had an electric light hanging down alongside of him, and by this light he worked all day with the result that he practically lost the sight of his eye, and then I began to think about it, and it occurred to me that our old friend, the visual purple, might have something to do with the difficulty.

Now, I remember a year or two ago of being in a hotel one night and the electric light was in such a position that I was obliged to look up at it a few seconds as I was in the act of turning it off. I retired, but right opposite my bed there was a door, the upper half of which was one large pane of ground glass which was illuminated by the lights in the entry. To my surprise, I saw on that ground glass a dozen or fifteen dark horseshoes. Now that showed me immediately that I had received sufficient illumination in looking up at that light to almost exhaust the retina for visual purposes over the areas covered by these dark horseshoes. Being of an inquisitive turn of mind, I took up my watch, which I always keep in a convenient place when I go to bed, and I found that the deepest one of those images did not disappear until nearly twelve minutes had gone by. Of course that was a test under peculiarly advantageous circumstances, but it shows that a light which is so intense as to exhaust the retinal purple in such a manner that it was not replaced for about twelve minutes, must be a dangerous light, and a room that is lighted by incandescent lights in chandeliers hanging down low, with the plain glass globes and the bare fibre burning into your eyes, is badly lighted.

I have hung up here some lights that I want to show you and say a word about them. They are two electric lights of the same power, about fifty candle-power, I think, and I want to hold them up for you to look at and see how you like them. When I put this plain one up, you get an image of the fibre,—the illumination that comes from that light comes entirely from that minute fibre,—in other words, you get as much illumination as you get from several gas lights all from that slender film ; therefore, the intensity of the illumination must increase as to the smallness of its source, and

that is where the mischief comes. Such a light as that has no business to be put anywhere so that its image will fall on the eye. Now, this other light has the same power, but you will notice it has a frosted bulb. It gives just as much light as the other, less about 3 per cent.,—that is, you get 97 per cent. of the light that you get from this plain one, but you get it from the full size of the bulb, and the same amount of illumination originating from a bulb as big as that has a very different intensity on the spot that it covers on the retina than it does when it comes from this small fibre. If some one will please put out the lights, we will try the effect of these two lights in a darkened room. This light with the plain glass bulb when I held it up a moment ago, gave you some annoyance to look at, but look at it now. You find that it annoys you a great deal more now in this dark room, and there are hardly any of you who care to look at it even for a few seconds. This one with the frosted bulb you can look at with comparative ease, and the reason of it is simply that here the whole bulb is the source of the illumination, while in the case of the plain glass, just that little film is the source of illumination.

We will now consider another light, the incandescent gas light, the so called Wellsbach light. That has the same qualities as the ordinary electric light. It has great intensity and greater whiteness, if anything, and steadiness. It has more steadiness than the incandescent electric light has in our ordinary country service, and more than it has on our Back Bay service, or at least as that service was until they put on their big storage plant. I asked them at the Back Bay Electric Works why they could not keep their lights at the same degree of intensity, and they said the trouble was that the current was so intermittently used,—that is, a hotel would take a considerable amount of it, and then, perhaps, it might not be used again for a quarter of a mile, and sometimes there were extra amounts used without notification, so that to keep their current steady seemed to be an impossibility unless it was more generally and evenly used. They hope to get better effects now that they have a storage battery, which they intend to use as a sort of a balance-wheel to supply the deficiency of their motors and dynamos when they are called suddenly to deliver a great deal of electricity.

To return to this Wellsbach light, it is an incandescent light of astonishing whiteness and brilliancy. It has most of the qualities of the other lights, and is steadier. If you will put out the lights once more, you will see illustrated the very thing that we had

shown with the two electric lights which I held up to you, only on a larger scale. Here is a very bright light, and it is a light that none of us want to watch a great deal; so that, even with that great brilliancy, it is not an ideal light for general illumination, but for certain purposes it is a wonderfully good light, and those purposes are near work, reading, etc., and even in those cases we must use it in a proper manner. With this shade put on we have a light that the average layman and a good many oculists think is a beautiful light to read by. It is so brilliant that you can almost see the fibre of the paper, and the average layman sits down and reads by it, feeling that he has the best possible light he can have. Now, how does that compare with the conditions that were presented to you a few moments ago? We now have a room that is very dark, and in that room we have a space that is brilliantly illuminated, and, with our eyes adjusted to this general darkness, we take up a sheet of white, calendered paper, and sit down and calmly look at it, perhaps for several hours, and when these facts are stated broadly one must conclude that it is a very bad thing to do. The eye is adapted here for darkness and yet we have a spot here, right in the middle of the eye, the very spot that you are using most, that is constantly fixed on a very bright light reflected by the paper from the Wellsbach light. Now, supposing you do want to read with that light, if you will please turn on the electrics again, you will see a highly proper state of affairs, and a very comfortable one for the use of the eyes,—the dazzling brilliancy of the single light is gone. If you have enough illumination so that the room to the eyes is light, then we have a light which is peculiarly well adapted to the purposes for which we want it. To have the thing ideal when you place a pencil on the face of your book you should have two shadows, one coming from the general illuminating light, and the other from the light by your side, and the shadow from your reading light should be a trifle darker than the one which comes from your general light. One thing more, the light of course should be to your left and at your back in reading, writing, or anything of that kind. The reason is this: If I arrange to have my light come from the right, all that I write is in shadow, and I am watching the formation of the letters in a shadow which constantly falls on the very point I wish to see most distinctly. The same principle applies for any other sort of work, you must have the shadows fall so that you can see what you are doing, and not have the shadows fall upon it. I also have here a scheme which the Wellsbach people wanted me to bring here to-night, a dark cap

which is put on underneath the light to modify it. Well, if your light is as powerful as this one is, I think it would be necessary to use it when it is new, because you could not get sufficiently brilliant illumination in your room to make the proportions what they should be, but these lights deteriorate after a little while, so that later on you could use it with this ordinary white cap, or none at all for that matter.

Now, to come back to my text, we will leave the artificial light and come back to daylight, which is the light I presume you gentlemen work by mostly. Everybody has said, because the artists say so (and I think very rightly for their purposes), that the north light is the best light to work by, but the artists' work is such that they do not want the sun. Now, a light without sunlight lacks certain qualities. The north light softens the outlines of things, and consequently I am not at all sure that a north light is the best light for many mechanical purposes. If you get sunlight, the shadows falling from it have very much sharper edges. I do not know enough about dentistry to form an accurate idea of the light you require, but it seems to me that a south light or a west light, if properly screened, would be just as good, or even better, than a north light for your purposes. Now, there comes in right here a very important point, and that is the question how we judge distances. This is something that very few of us have ever given any thought to and it seems to be somewhat of an instinctive action. The child has to learn to judge distance, for when it first begins to observe, the things at the other end of the table seem to be within his reach until he learns by experience. We judge depths by shadows. If you have a cavity, and the light is from one side, the depth of that cavity is judged by the angle with which the light falls across the bottom of it. That is done instinctively, and it seems to me—at least from a theoretical stand-point—that you would get a sharper shadow from an extreme south or west light.

But there is another important fact that I would call your attention to, and that is the utter disastrousness of cross lights in judging depths. If you put a patient so that the cavity into which you are looking is illuminated from two sources of light of equal strength, you would get a shadow from each side, and where they cross you would have your deepest shadow, so that that particular point would always appear to be the deepest point of the cavity. If you cannot judge depth without being obliged to look at it very closely then you are simply fatiguing your eyes. The man who attempts to do mechanical work in a cross light comes to grief.

It requires much extra exertion to judge depth in a cross light, the eyes being focussed up to their utmost standard every minute, and the effect may be to ultimately cause near-sightedness. The value of the shadow in all mechanical work is something that is not thoroughly understood. One of the great electric light companies in this city got an idea that they would furnish the rooms in which their people were doing fine mechanical work with the best possible light, so they fitted up their draughting and engineers' offices, etc., by painting the ceiling white, and then they put in an arc light; then they put a shade underneath that, the upper side of which was also painted white, and the result of this whole scheme was that the light was thrown up on the ceiling and diffused down, and they had a brilliant, white light, but to their utter astonishment every one complained of the light, and inside of two months two of the four draughtsmen engaged there were patients of mine.

If you had gone down to see the light they were working in you would have found yourself in a very brilliantly lighted room. The whole air would have seemed radiant with light, but you would not have found a shadow in that room,—you couldn't make a shadow,—and the result was that the draughtsmen, who had been accustomed to judging when they had reached a certain point by the angle made between the shadow and the pen or pencil, found themselves obliged to look closely for every point to which they drew a line, and their eyes were kept under a heavy strain all the time, and naturally they soon gave out. Therefore, shadows are not without great value in judging distances.

I do not know that I have anything more to say; I think I have exhibited all my crankiness on the subject, but if I have impressed it upon you gentlemen to look out for your eyes, to get a proper illumination both for your work and in your houses, and if also I could make enough impression on the community at large that electric arc lights should not be hung in the streets a few feet above our heads as we walk along,—and not a few of them with bright red globes, which is a combination that I will guarantee will destroy any man's eyes who looks at it much,—I shall have accomplished something which will be a great boon to the community in the long run.

SOME OF THE PHYSICAL PROPERTIES OF METALS.[1]

BY PROFESSOR A. A. BRENEMAN.[2]

It has been well said that science is only "educated common sense," and there is nothing in science that is valuable in practice which cannot be told in language quite plain to intelligent persons outside of the given field of science. The subject for this evening, "Some Physical Properties of the Metals," is one of very wide range, so I shall limit my talk to a consideration of some of the physical properties of the more familiar metals, especially such as you in your work are accustomed to deal with. The term metal itself is difficult to define. A well-known authority on this subject has said that there is no representative metal,—that is, that no one metal combines in itself all the qualities which occur to us when we use the term metal; the only typical metal is an ideal metal.

Before going into a consideration of the properties of metals on which I expect especially to dwell, I will first ask your attention to a matter of theory. Theory in chemistry and physics is something like diagnosis to the physician, it outlines the subject and furnishes a bases of treatment. Unlike diagnosis in its limited meaning, a given theory may furnish a working hypothesis for the entire science. The method of scientific progress within the age in which science as such can be said to have had a real existence, has been that of fixing upon some interpretation of facts already at hand, and upon the basis of this interpretation of facts constituting a theory by which to devise experiments that will act as a test of the theory, and serve also as a means of discovering new facts. Every theory starts upon a very small basis, a mere guess may be the beginning of it, but science is not content with guesses. The guess must be tested by experiment. The guess serves only to suggest an experiment, and the result of the experiment is itself a test of the value of the guess. Add together many guesses or speculations, and many experiments testing the validity of these speculations, and we have the basis of a theory. It has been said that in science one "guesses and checks his guesses." In this matter of devising experiments which shall serve as a test of speculation, imagination itself is an important factor. The mind must move through all the materials it has at hand and pick from them

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[1] Read before The New York Institute of Stomatology, April 7, 1896.

[2] Late Professor of Industrial Chemistry in Cornell University.

a suggestion for its second step. Many years ago Professor Tyndall used the expression, "the scientific use of the imagination," and wrote under that title an essay which will always be regarded as a classic; yet in his day Professor Tyndall was taken to task by shallow people outside of science for the use of the term, and it was claimed to be an admission that, after all, the matter of science was largely imagination. No greater mistake could have been made. The meaning of Tyndall was that the imagination must be used for its suggestiveness in devising experiments. After that, experiment will settle the value of the suggestion. You see, then, that the imagination in this sense, while it is given an important place, is entirely subordinate to the principal work of science.

Now, in considering any form of matter we must know something about all conditions in which matter can occur. Matter, as you know, can take any of the three states,—solid, liquid, or gaseous; and we shall find that our familiar substances, the metals, can occur in all of these conditions. In fact, any metal can be made to take the state of a solid, a liquid, or a gas by changes of temperature merely. There is a well-known liquid metal, mercury, and there is good reason for believing that the lightest of all gases, hydrogen, is itself a metallic body. That most metals, however, are solids is familiar enough to you. It has always been my experience that in speaking of the properties of matter, and in thinking of them, one works with more system and with more effect if he has at hand an intelligible theory of matter. What is the difference in these three different states of matter; and why should a solid, a liquid, and a gas have each their distinctive properties? Chemists and physicists have long ago come to the conclusion that, in the main, a theory of matter which regards it as made up of distinct and very minute particles serves best to explain the properties of matter. There are exceptions to this, of course; there are other theories which have had a certain support in all ages, but the working theories of physical science deal mainly with the atom and the molecule as the units of matter. By an atom we mean an exceedingly small particle of matter. Primarily the term means something which cannot be further divided, but the discussion of the definition in this sense is merely a metaphysical one and need not concern us here. Let us assume that somewhere, in subdividing matter, we come to a practical unit,—the smallest particle. It is further believed that these atoms of which simple elements are composed can unite and form groups of greater or less size, and these groups, whether made of the same kind or different kinds of

matter, we call molecules. There is good reason for believing, although it cannot as yet be proved, that there is, after all, but one form of matter, and that the seventy odd elements which the chemist knows of as distinct forms of matter may themselves be merely groupings, of more or less complexity, of one primary matter.

To deal now with these units of matter, the atom and the molecule, let us consider first the state of gas. A gas is believed to consist of particles of matter separated by distances much greater than their own diameters, which particles have a free motion that carries them forward in straight lines until they are arrested by contact with other atoms or with other forms of matter. In a liquid body the particles differ principally in that they have less freedom of motion. A particle of gas, we believe, might fly indefinitely in a straight line if not arrested. A particle of liquid seems to have somewhat the motion of a pendulum; if not a direct to-and-fro motion, at least a motion in which the particle returns, after a path of greater or less complexity, to the point at which it started. A liquid, therefore, while it has no definite shape, has yet a power of holding together, as may be seen when it forms drops. Mercury when spilled upon a plane surface breaks into little globules, and below a certain size the particles of mercury show a strong tendency to hold together. This tendency to hold together is only an expression of the fact that all the particles of this mass are confined to a certain sphere of motion and cannot move away from one another indefinitely, as the particles of a gas do. In the solid state it is believed that the difference is merely one of less freedom of motion permitted to the particles. The molecules of a solid have probably the same pendulum-like motion, but in much shorter paths than those of a liquid, and the distances between different molecules are evidently much less. If you will keep in your minds these rough distinctions between the three conditions of matter as they affect the molecules or smallest particles of a mass, you will have a mental picture which will enable you not only to recall the properties of matter more readily, but to explain the behavior of matter under given conditions when you have occasion to think of it.

Let us consider the properties of the metals themselves. One of the most evident properties of the metals, one in which they differ widely in degree, is that of hardness. Consider the range of hardness exhibited between the liquid metal mercury, or the metals sodium and potassium, which can be worked like putty between the fingers, and the hard metal iridium, or its alloys, which are used

for giving points to gold pens. Or consider, again, the hardness of steel, a form of iron differing only from iron in having a certain proportion of carbon in combination. Why should one metal be hard and another soft? It is not a question merely of weight, because the softest of all metals, mercury, is one of the heaviest. I think you will see that the hardness of a metal depends in some way upon the difficulty of pushing the molecules apart. The point or edge with which you try to scratch the metal cannot enter it because the molecules of the metal persist each in following out its little path and refuse to be pushed out by the foreign substance used to test its hardness. It is the motion of the atoms which resists the point that tries to penetrate the mass.

Closely related to the property of hardness is that of tenacity. By tenacity we mean the power of resisting rupture. The tensile strength of a metal is measured by shaping it into a wire or rod of known cross-section, and then noting the force exerted at the moment when that rod or wire is broken apart by pulling upon it. Tenacity depends again upon the power of the molecules in persisting in their original paths. Anything which separates one portion of the mass of metal from another must, to some extent, interfere with the motion of the molecules as it existed previous to rupture.

Malleability is a property which is closely related to tenacity. We mean by the term malleability simply the property of flattening out under the hammer. Gold is an eminently malleable metal, it can be beaten into thin leaves. A metal which is spread out into a thin sheet under the hammer evidently suffers a violent displacement of many of its molecules; many of them are forced to take up new positions entirely different from those which they first occupied; and while their motion may not be greatly affected in the new position, a great deal of friction has occurred during the change, and this friction is made evident by the amount of heat set free during the change of position of the particles.

Brittleness is the reverse of malleability. While the majority of metals tend rather to malleability than to brittleness, yet there are marked cases of this second property. Antimony and bismuth fly to pieces under the hammer. Even zinc, at certain temperatures, is as brittle as glass and can be ground into a powder. Ductility is a property closely related to malleability. It is the quality which permits a metal to be drawn out into wire. This property depends again upon the persistence of the molecules in their chosen paths, their power of holding to those paths and to one another.

Whether this is a quality of actual attraction of particle to particle, as iron is attracted by a magnet, or whether it may not be some interlacing of the paths of oscillation of each particle, which links the mass together in a certain way, it is impossible to say.

Of the property just mentioned there are applications in the arts which rest upon such explanations as have been given. The drawing of wire, the spinning of metals upon a lathe, the spinning of a sheet of metal into the form of a hollow vessel through its tendency to escape from the point at which it is pressed between a hard surface and a hard tool, and the so-called squirting of metals under pressure, are all related to the foregoing properties. The squirting of a metal is effected by confining a soft and malleable metal in a cylinder, where it receives the pressure of a piston, while at the same time it has no means of escape from this pressure except through a small orifice in the bottom of the cylinder. Under these conditions the metal escapes through the small opening in the shape of a wire, or ribbon, or tube, according to the shape of the opening, and behaves as it passes through the opening as if it were in a liquid state. It is evident that the particles escaping through the orifice have moved very widely from their original position in the mass. It is evident, also, that as the piston descends in time so as to expel all or nearly all of the metal, that all of the particles originally in the mass must have suffered great changes in position. We speak in such cases of the metal flowing; and, doubtless, as in the flow of a stream of water, the motion is greater about the centre of the mass, and less along the sides. But at any given moment the motion at the orifice is evidently much greater than at any other point of the mass. Here there has been imparted to each particle, besides its own proper motion, which may have persisted all the time, a very large motion of displacement; it has been carried along as it moved somewhat as the moon moves in its own path around the earth and yet moves with the earth through space. The amount of pressure required, the degree of friction, and, therefore, the quantity of heat set free,—all of these depend originally upon the nature of the metal itself. The special form of motion which its particles originally had, the distance of those particles from one another, and probably also the weight of those particles, are all elements of their behavior. Yet by this analysis you can form a certain picture of the moving particles as the piston descends and the mass in the form of wire escapes from the opening.

The mobility of metals is a property nearly connected with those

just treated of. I have said that a gas is perfectly mobile. In liquids we have very different degrees of mobility. The light liquid, ether, moves readily in a containing vessel, much more so than water. Mercury, although a much heavier liquid, is extremely mobile. A basin of mercury from which light is reflected so that the reflected light can be measured by the motion of a bright spot over a graduated scale is the most delicate instrument for recording motions too small for the unaided eye to see, and a surface of mercury is a most ready means of registering very slight earthquake tremors.

The flow of metals under such stress as is given in hammering or wire-drawing, or squirting, depends largely upon their mobility. Furthermore, when metals are thus changed in shape under the action of forces they seem to undergo a change which leaves them permanently altered under ordinary conditions; although this change can be annulled by very simple means. It is as if the particles at first violently crowded out of their places had not been left room for that free motion which they originally had, but are under a condition of constraint. Suppose that at certain points of the mass they are crowded together so that the original length of their path is not permitted. This would evidently produce some difference in quality, because the structure of the mass is not what it was at first. In practice we know that the mere device of heating a metal so strained or warped, for a considerable time, to a temperature below its melting-point will bring it back to its original condition, so that it will show again the same malleability, ductility, etc., as before; whereas, under the temporary strain it may have been harder or more brittle than at first. In the beating out of metallic foils, or in the drawing of wire, it is necessary to stop from time to time and anneal the metal,—that is, heat it to a certain temperature and allow it slowly to cool. Under these conditions there seems to be given that opportunity for the particles to return from their cramped positions to the original freedom of motion, and the metal regains its former properties. In the harder metals, such as iron and steel, the term *fatigue* is used to express the condition of strain under which the metal exists after the action of force upon it; and the fact that under the normal conditions it will in time regain its original properties quite justifies the use of the term fatigue.

In their behavior under heat metals exhibit the greatest variety of action. Mercury is a metal liquid at common temperatures; it is melted at those temperatures. We have only to cool it to 40° below zero and it becomes a solid body. And so we have among

the class of metals every variety of fusibility, from mercury at the lower limit to such metals as chromium and platinum at the higher. One melts below the heat of the hand, others only at a temperature of the oxyhydrogen blow-pipe. Inasmuch as all matter expands under the action of heat,—that is, extends its boundaries in all directions,—we are led to believe, upon our present theory of matter, that the effect of heat upon its particles is simply to make them move with more force, and therefore through wider limits. It would be expected, therefore, that when a solid body such as a metal is sufficiently heated, its particles would push themselves apart until the distance between them was so great, and their own freedom of motion so great, that the solid state would be lost and a liquid would result. And if the temperature were carried still further, a further increase of motion would result finally in absolving all the particles from their attraction for one another, and from their motion, perhaps, in fixed paths, and would give us in time the perfect freedom of motion which exists in a gas. Solid, liquid, and gas, therefore, are simply three states of matter differing in the heat or pressure which has been applied to them; and there is no substance which cannot be brought, at a sufficiently low temperature, into the state of a liquid or a solid, or at the other extreme of temperature, into the state of a gas. And we may go further and say that there appears to be certain analogy between this uniform change of state which occurs under the action of heat and the peculiar and partial changes which occur when malleable or ductile metals are submitted to pressure or tension. Possibly the effect of force at the point where it is applied is such as to throw the particles immediately about that point into violent motion, or to give them that great freedom of motion which corresponds to the liquid condition. It has been very shrewdly said that malleability is "indeterminate fluidity." Remembering that the three states of matter are all of them continuous with reference to one another, that there is no sharp dividing lines between the solid, the liquid, and the gaseous states, it may be said that great pressure, or great force exerted in tension, simply brings the matter immediately under pressure into a changing state which is the bridge or link between two different states of matter.

Another property of matter of less importance to us here is elasticity, the power quite common to many metals, but possessed in widely different degree by different metals, of returning after elongation or compression to their original shape and form. A bar of steel may be drawn to greater than its original length, or it may be com-

pressed to less than its original length, and yet when the force is removed it will return accurately to the first dimensions. If stretched or compressed beyond certain limits, it fails to return; it is said to have passed beyond the limit of elasticity. Here again we recognize a condition of freedom of motion within certain limits, and beyond that a condition of constraint; and applying it as before to the motion of the particles, we say that in the one case the particles have been moved out of their position but not so far as to prevent them returning to their original paths; the path may have been elongated, may have been contorted, but the original motion could reassert itself. In the second case, under strain the particles were compelled to take permanently new positions and to acquire to a certain extent new paths.

Color and lustre are surface qualities. Color depends merely upon the fact that the particles at the surface of a substance vibrate in unison with the medium from which they receive the light; light itself being a form of motion. But, inasmuch as white light is made up of many different rates of vibration, corresponding to the different colors which compose it, the vibrating particle receives or absorbs only the motion which corresponds to its own rate. The color represented in that motion will be lost from white light. The color corresponding to a different rate of motion, and therefore not absorbed, will be thrown back or reflected from the metallic surface, and the surface will appear to us to have a corresponding color. Copper is red because it absorbs from sunlight or white light all rays but the red and throws the red rays only back to the eye. Most metals absorb little of the motion of light, and throw most of it back. They are usually, therefore, of whitish or grayish color. Lustre is merely reflection of the light as a whole. A metal with an unpolished surface breaks up the light and reflects it in many different directions. In a polished surface all particles are lying virtually in the same plane, and all rays of light are thrown from that plane at the same angle. There is a difference to be noted, however, between the true lustre and simple reflection. Lustre is a quality of reflection, and is easier to name than to describe. Illustration will perhaps make my meaning clearer. We have only to think of the difference between the reflection of a plain glass mirror, on the one hand, and the lustre of polished lead or iron on the other. A slight element of color is introduced, perhaps, into the reflection, and this is the characteristic element in lustre.

The subject of alloys cannot be omitted from a discussion of the

properties of metals. By an alloy we mean a mixture, in its simplest sense, of two metals; but the term mixture can by no means be used without qualification. It is, indeed, begging the question to use such a term, because the nature of alloys is one of the profoundest subjects of discussion in chemistry and physics. Are alloys mere mixtures, such as may be made of ink and water, or are they chemical compounds, such as occur when sulphur and iron are heated together? Some metals, when melted together and then cooled, show properties differing so greatly from those of either of the original metals that we can hardly believe them to be merely mixtures of the two. The alloy instead of melting at a temperature which is a mean of the melting-points of the two metals proportionate to their weight, generally melts at a lower point than this mean. Its powers of conducting heat and electricity, its relative volume, its solubility in acids, a large number of its properties, chemical and physical, are different from those of either of the original metals, and different from the mean quality of these metals with reference to the proportions taken in the alloy. Also it happens in many cases that, with certain definite proportions of two or more metals, we have alloys of new and remarkable properties; while a slight variation in the proportions, instead of giving merely proportionate change in quality, gives an alloy very little resembling the first. Now, this definiteness of properties corresponding to definiteness of composition is the characteristic and the test of chemical combination. The subject, however, is too wide a one to follow here. There are arguments, though fewer, in favor of the belief that the alloys are merely mixtures, but a compromise view is, perhaps, the most reasonable. We cannot escape the conclusion that chemical combination occurs in many cases, but the difficulties on the whole are simpified by assuming that alloys which are definite compounds may themselves dissolve in an excess of one or the other metal in the alloy, as many chemical compounds dissolve in the separate ingredients of the compound. And such an explanation would probably meet most cases where true chemical compounds are not formed.

There is one other point concerned here. There is a phenomenon known as allotropism, which very much modifies the qualities of elements and compounds. By allotropism we understand, referring again to our molecular hypothesis, an arrangement of the atoms within the molecule, such that the same substance, as iron or silver, may, without changing its chemical nature at all, exhibit very great difference in physical properties. Allotropism may even

make changes in chemical properties, but the distinction is that the change is always a temporary one, and that the allotropic form of matter can always be brought back, and generally by simple means, to the original state of the same matter. For example, common phosphorus is a yellowish, wax-like solid, which melts at the temperature of the hand, and dangerous accidents have resulted from its handling. Red phosphorus is a substance obtained by merely heating common phosphorus with exclusion of oxygen. This second form of phosphorus is a red powder, requiring a temperature much above that of boiling water before it will burn in the air, being entirely safe to handle, not acted upon by chemicals in the same way, and practically harmless, while common phosphorus is a deadly poison. And yet we have merely to heat red phosphorus to a certain temperature in the air and it passes back at once to the state of common phosphorus. Oxygen, the familiar gas of the air, is readily converted into another gas, called ozone, which differs in a most marked degree from oxygen, and yet at a certain temperature it passes back into oxygen. We have in these cases, then, a simple change of physical quality without the slightest change of chemical integrity. The substance could be converted in a closed vessel from one state to the other and back again, nothing being added and nothing being taken from it.

Just as we have these cases of non-metallic allotropic bodies which I have given for the purpose of illustration, so we have among the metals some remarkable cases of allotropism. Tin under the action of great cold takes the condition of a grayish brittle substance, in which the original metal would not be recognized; yet there is no difficulty in bringing this back to the original tin. Silver, antimony, copper, and other metals also form allotropes.

Not to dwell further upon this subject, there is reason for believing that in alloys many metals may exist in the form of their allotropes, and so even if these alloys were mere mixtures, we should expect them to have qualities different from those of the metals concerned, or from the mean qualities of the metals. Whatever latitude we give to chemical or physical interpretation of the phenomena presented by alloys, it is certain that in the main changes of quality go with changes of proportion. Considering the number of the metals, the readiness with which the qualities of the alloys change with the proportions of these metals, and the infinity of permutations thus possible, the task of outlining the properties of all possible alloys is an infinite one. You will see, from

the very brief treatment made of some of the properties of metals that the study of the alloys themselves offers a field for life-long investigation. However, what one knows practically of the metals may be applied at once in the study of their alloys, and I may hope, at least, that the few facts which I have passed in review before you, and the attempt that I have made to connect them and marshal them, so to speak, under a comprehensive theory, may not be without some element of practical value to you.

THE ADVANTAGES OF CATAPHORESIS IN DENTAL OPERATIONS.

BY PETER BROWN, L.D.S., MONTREAL.

THE medication of dentine for the alleviation of pain usually accompanying the operation of filling teeth, has received a large share of attention from the dental profession, and no other tissue in the human body has been so difficult to temporarily anæsthetize without danger of destruction, as the fibrillæ in the dentine.

On the introduction of cocaine some years ago as a local anæsthetic, the dental world hailed its advent with much anticipation of a successful obtundent, but, much to our disappointment, it was found to be a failure as far as its effect on dentine was concerned.

More recently experiments were conducted with a mild current of electricity with a view to forcing this alkaloid to enter the dentine by the action known as cataphoresis, it is also known as electrical osmosis, or anodal diffusion, and is the passing of a medicinal substance such as quinine, strychnine, cocaine, or iodine, through organic tissues in the direction of the flow of the current, that is, from the anode to the cathode.

This property of electricity has been known for a long time, but its application to this treatment is of recent date. Its success in this direction has been so abundantly proved by reputable and competent practitioners that its use will soon become as universal as the dental engine.

Following is a report of a number of cases taken from every-day practice with records of methods employed for the application and graduating of the current, and the quantity and the pressure of the circuit at the time of passing through the tooth under treatment.

Case I.—Master T., aged twelve. Right lateral incisor, servical cavity extending across the labial and around to the median approximal surface; this was a very sensitive cavity as these cavities usually are; after the dam was applied and the cavity wiped dry, a saturated solution of cocaine was placed in it on a small piece of cotton, a bicuspid clamp to which was attached a piece of brass wire with a platinum tip was adjusted to the bicuspid of the same side and outside the dam; this wire was not in electrical contact with the clamp, it was fixed there by being vulcanized to it, there being a thin layer of rubber between the wire and the clamp; it did not matter if the clamp cut through the rubber dam, the battery wire was secured to the electrode by a spring clip; the current being turned on, the milammeter indicated one-fifth of a milliampère and the voltmeter one and three-eighths volts before the patient gave evidence that the current was felt; in five minutes the current was increased to two-fifths of a milliampère and the voltage to two and one-eighth; in five minutes more the current was increased to two-fifths of a milliampère at a pressure of four and one-fourth volts; this was allowed to remain for three minutes, when the cavity was excavated without pain until nearly the end, when a second application was made and a maximum quantity of one and three-tenths milliampères was indicated at a potential of eight and one-fourth volts.

Case II.—Miss M. Right superior first molar; pulp exposed and patient suffering toothache at time of treatment; current applied same as in previous case and following readings noted; on first evidence of the current being felt a current of one-twentieth milliampère was indicated at a potential of three-eighths of a volt; in ten minutes the current was increased to one-tenth milliampère at one volt; in five minutes more to one-fifth milliampère at one and one-half; after ten minutes' treatment at this rate the pulp was found to be completely anæsthetized, and was removed in the usual manner without pain. This case was remarkable from the small quantity of the current used, the maximum quantity being one-fifth and the maximum voltage two and seventh-eighths.

Case III.—Mr. B. Pulp exposed in lower molar; preparation same as in previous cases; current indicated at first contact one-tenth milliampère, increased in five minutes to one-fifth, in three minutes to two-fifths, within the following five minutes to three-fifths; within twenty minutes from first application the electrodes were removed and the cavity excavated with a No. 8 round bur in right angle high pressure, completely removing the coronal portion

of the pulp; the roots were still sensitive, requiring a second application for five minutes, when the roots were cleaned out as thoroughly as these roots can be cleaned. In the second application a current of from one-tenth to one and three-fifth milliampères was used. The voltage varied in this case from one to eight and one-fourth.

Case IV.—Mrs. T. Approximal cavities in lower left bicuspids and canine, four cavities in all. The current was applied to these four cavities at the same time by using two clamps; on first application a current of three-fifths was used without pain, and increased in five minutes to one milliampère; in twelve minutes all four cavities were anæsthetized and prepared for filling painlessly; the voltmeter was not in circuit in this case, so no record of pressure was obtained.

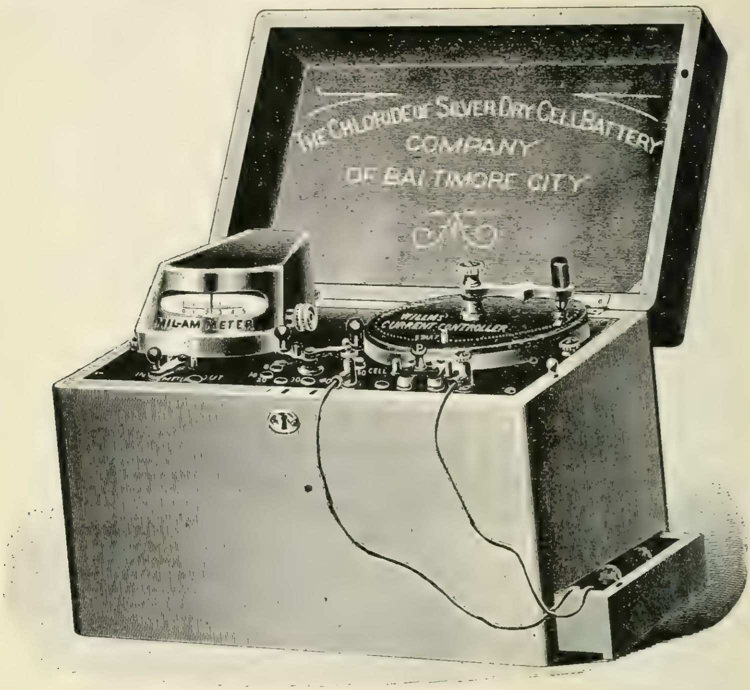
Case V.—Miss W. Left lower molar exposed pulp; current used one-fifth milliampères at two and one-fourth volts; time five minutes, increased to two-fifths; voltage nine and seven-eighths, increased in three minutes to three-fifths; voltage fifteen and one-fourth, increased in five minutes to four-fifths; voltage nineteen and five-eighths. This pulp was completely anæsthetized in twenty-five minutes. The resistance in this case was very high, at one time being as much as twenty thousand ohms.

Too much attention cannot be directed to the source of current and the means for controlling it; there seems to be a general impression among the dental profession that a volt-regulator is what is required, and the writer has received many inquiries in reference to using street circuits and dynamos and volt-selectors, etc. It should be borne in mind that it is the quantity of current or ampèrage that does the work; the pressure or voltage merely overcomes the resistance and forces the current through the circuit.

In order to do this satisfactorily and with a minimum of pain or disagreeable sensation to the patient, we must have a steady and reliable source of current and a reliable rheostat to graduate this current. The rheostat, or regulator, or controller, as it may be termed, should be capable of varying the pressure and quantity of the current without sudden interruptions or sudden increase of current.

The most satisfactory apparatus the writer has used yet is that illustrated on page 368. Here we have twenty-five cells of dry battery which will last a dentist for cataphoric work for at least two years, and then may be renewed at less than one-third the original cost of battery; they are superior to the storage-battery,

as they require no special care or attention. In the same case will be found a "Willms dry current controller," with switch-board or cell-selector.



When desired, a milammeter may be added to the outfit, and will be found a very desirable addition, as one can always be assured that the current is passing through the patient under treatment.

Medicaments.—The writer has experimented with varying success with "aconitine," using a specially-made triturate of one one-hundredth grain. This drug was suggested by Dr. Charles Brewster, of Montreal, who used it for obtunding sensitive dentine thirty years ago.

In two cases tried it was successful, but failed in others to produce anæsthesia as thoroughly as cocaine.

In using the guiacol cocaine solution, it was found in the writer's experience that no better results were obtained by this combination; it was also ascertained that guiacol was not a preservative of cocaine and the solution decomposed. The odor of guiacol is also very objectionable. A saturated solution of cocaine is the best agent to employ, made just as used by saturating about one-sixth or one-

eighth grain with enough water to dissolve it, and absorbing it on cotton sufficient to fill the cavity under treatment.

An improved method of clamp for holding the electrode in the cavity is to have a small set screw attached to the clamp and insulated from it by a rubber washer; then, if the clamp comes in contact with the tooth, there is no circuit established outside where it is not wanted.

The following case shows the advantage of a milammeter. A clamp was attached to a lower first molar outside the dam; a current of three-tenths milliampère was indicated in the meter. A few minutes later on, glancing at the milammeter, a current of three and one-half milliampères was indicated. This showed a short circuit somewhere; it was found in a hole in the dam, made by the point of the clamp.

There is good scope for improvements in methods of attachment of electrodes; they must be readily attached, capable of adjustment in any direction, and allow the patient freedom in moving the head, and to some extent the lower jaw.

A good plan for the negative pole attachment is an arrangement shaped like a horseshoe and placed over the wrist. An adjustable screw may be put through one side of it and bear on a disk which would press down on the wrist; this would give the greatest freedom to use the hands to hold a paper or magazine which the patient might read while under treatment. Moist lintine should be placed next to the skin, as the moist surface makes a good conductor and lessens resistance. So far no bad results have been noted from this treatment. Cocaine has no local destructive action on nerve tissue that we are at present aware of, though it has a very destructive action on nerve-cells when taken systemically and for a continued period.

The quantity of electricity used is so small and so mild in strength that it can have no effect as a tissue-destroyer. Now that the efficacy of this treatment has been established, we can only hope that no unexpected results will crop up to mar our anticipation of painless operations on the teeth.

AN INTERESTING CASE.

BY DR. S. L. GOLDSMITH, NEW YORK.

Miss A., who at the time was undergoing some painful dental treatment, said, "Oh, if hypnotism were only advanced to such a stage that one could have the teeth filled without pain!" I replied that it was not an impossibility even now; in fact, that it had been done. The patient then expressed a desire for me to try it upon her, and with the precaution of having a third party present, I endeavored without success to hypnotize her. In the mean time I ascertained that the patient was a sufferer from insomnia, and, as I saw a greater object in view, I tried again at her next appointment and succeeded. The hypnosis was complete.

I excavated the cavities and, in fact, separated teeth with almost no pain. The method used was the so-called "mixed method," —that is, a combination of the suggestions of Bernheim and the strokings, etc., of Charcot.

Now, having found that the patient was a good subject, and as insomnia was out of my sphere of practice, I took her to a medical colaborer of mine, who at once examined her, and finding no organic disorder which could cause her trouble, ventured a very favorable prognosis with the treatment mentioned. The physician then put her into the hypnotic state and suggested to her that she would sleep the ensuing night from ten until 6.30 next morning. At 9.30 that evening the patient was so sleepy that she could no longer hold her book, and retired. Upon awakening she looked at her watch, the hands of which pointed to 6.35. For years her limit of sleep had been three hours a night. The physician has gradually lengthened the time over which the suggestion was to have effect, until now one suggestion has given her a proper night's rest every night for six weeks. I have no doubt that this can soon be lengthened to six months, and, in fact, that in a couple of years the suggestion will not be necessary at all.

Before the commencement of our treatment, Miss A. was a nervous, morose individual, who jumped every time the door-bell rang. Since the treatment she has materially gained in weight and is as happy as a well-nourished young lady should be.

LIGHTING THE MOUTH.

BY WILLIAM H. ROLLINS, BOSTON, MASS.

The arc light is the best artificial light for the mouth, and even in good daylight it improves the seeing in filling difficult cavities. The cut, which is taken from a photograph, shows a good way to arrange this light, as is proved by my having used this apparatus without change for three years.

THIRD SET OF TEETH.

The Sunday *Herald* of Syracuse, New York, reports a case at considerable length of one James Slattery, of that city, who has apparently erupted late in life a portion of the full denture with the prospect of more teeth presenting in the near future. Dr. S. B. Palmer, of Syracuse, made an examination of the case and reports as follows:

"In the inferior maxilla are eight teeth located as follows: four incisors and two cuspidati corresponding with the cuspidati of the superior maxilla, and two small bicuspids on the right side. The cuspid on the left side and the second bicuspid on the right side are somewhat loose. The alveolar process does not extend up and entirely around the roots. The other teeth are firm and of usual size and length, but are somewhat overlapped from crowding and discolored by smoking; in other respects they present the appearance one would expect at his age.

"On the left side, in place of the two posterior teeth, ordinarily found, are three parts of teeth, resembling roots, having grown up partially out of the gums. They are not firm or well-developed teeth. The man insists that they also appeared within the time mentioned, two years previously, and that they belong to the same set. One is loose and turned against the cheek, and will require extraction. The other portions of the jaw show no signs of further eruption of teeth, as considerable absorption has taken place.

"An examination of the superior maxilla shows that the third set, more numerous than those in the inferior, will soon make their appearance. The jaw is thick and full nearly all the way back, raising the lip and giving the fulness peculiar to a child's jaw

of six or seven years, or about the period of the eruption of the teeth of the permanent set."

The history of this singular case is briefly as follows: James Slattery is a well developed man of six feet two inches and weighing two hundred and thirty pounds. At the age of eighty-seven he was edentulous, having lost his second set of teeth. At about this period he noticed a painful condition of the gums, or, as he expressed it, "they began to ache badly," and for two years they continued to erupt in the inferior maxilla, and will, in time, develop in the superior.

This seems the best attested case of third dentition we have met with on record, and it is hoped Dr. Palmer will secure testimony as to the character of the set prior to becoming edentulous through advancing years. The dental profession has regarded a third set of teeth as a myth, and with some reason, as most of the so-called third sets have proved, on investigation, to be simply delayed dentition of the regular second set.—[Ed.]

Translations.

SOLILA.[1]

BY THEODORE FRICK, D.D.S., SWITZERLAND.

If we glance through the professional periodicals of the day, we find that their advertising pages offer more different materials for filling than ever before. And many, nay most, of these preparations are equipped, on paper, with such superior qualities and such promising names that one might almost believe that operative dentistry had reached the acme of perfection, and that artificial teeth were no longer necessary, except for the aged. However, the more such aggressive claims multiply, the more difficult does it become for the individual to distinguish between good and bad. Many may have grown so sceptical by reason of the disappointments that they have experienced as to try no further novelties. So much

[1] Translated from the Schweizerische Vierteljahrsschrift für Zahnheilkunde, Marz, 1896.

the more is the duty of those who have tested new preparations thoroughly, and by trustworthy methods, to make their opinion publicly known to a larger circle, whether the result of their tests has been favorable or unfavorable.

For many decades, gold has properly been rated as the most enduring material for fillings. The principal reason why there has been a continual effort to substitute other materials for it is not, as is frequently claimed, the high price of the material itself, but the fact that its use demands so much time, skill, labor, and effort on the part of the operator. Or, in other words, it is not "dear gold" that makes gold fillings dear, but the time and the manual facility required to produce them. Now, the most recent of the gold preparations, called "solila," spares us a part of these two exactions, and, for this reason, deserves to be raised above the level of ordinary "novelties."

"Solila," a crystal gold, is prepared by its inventor, Dr. E. de Trey, a Swiss dentist, and is to be had at all dental depots. Its treatment is essentially different from that of all other gold preparations. The operator who intends to work with solila should, if possible, secure an opportunity of witnessing a practical demonstration of its use. As I have already inserted about eight hundred gold fillings in the mouth, using for the purpose about ten ounces of "solila," I consider that I have sufficient experience to offer a few practical suggestions. I assume that the reader has already made good gold fillings with the preparations of gold heretofore in use, and therefore I call attention only to those points in which there is deviation from present practice.

Even in the preparation of the cavity we have a slight difference. We can almost entirely dispense with anchorages and under-cuts. It is a matter of course that this gold, like any other, does not adhere to the walls of the cavity, but remains firmly fixed in the excavation only by reason of its form. After the caries has been removed, and *the edges of the enamel have been sufficiently cut down* and polished, care should be taken, if possible, that the interior of the excavation be somewhat larger than the orifice. If this is impracticable on account of the proximity of the pulp, or for other reasons, *very slight* under-cuts are made, not deeper than a fissure bar will leave in the dentine. We are naturally guided in this by the general rule, that the more pronounced the contour of a filling is, the more thorough should be its anchorage. Nevertheless, deep under-cuts and drilled anchorages are to be altogether avoided, because, as we shall see later on, it would only occasion a

useless waste of time to fill them. Excavations of any kind, to be used as starting-points, are wholly unnecessary.

Coming now to the process of filling, we will consider first the gold itself. "Solila" is put on the market in small boxes, containing one-eighth ounce each. It is prepared in four different numbers, of which each has its own peculiar properties and corresponding use. Nevertheless, it is possible, in case of necessity, to produce a good gold filling with one of the numbers only. Nos. 1 and 2 are very soft and almost plastic; they will probably be used most frequently. They are especially adapted for beginning a filling and for continuing it up to the point where, with a concave surface, it reaches the edge of the enamel. No. 1 is thicker and denser and is consequently calculated for large cavities; No. 2 is somewhat thinner for smaller cavities and excavations. No. 4 is rather more rigid and denser than the other three numbers; it is of service principally for the construction of a good surface and for the building up of contours. No. 3 is a very thin and extremely pliable gold, particularly available for the entire filling in very small cavities that are difficult of access. It is also suitable for finishing surfaces and contours in place of No. 4, when the latter would involve too large an application. In the small boxes, the gold is arranged in narrow strips, separated by soft cushions. This peculiar method of packing is, in itself, an indication that solila should be handled as gently as possible before insertion, and that it should never be subjected to pressure. It must not be touched, except with the pliers, preferably with the gold-pliers made especially for this purpose, which, by reason of their slender tongs, make any compression of the gold taken up almost impossible. For cutting the gold into smaller pieces, it is best to use the De Trey shears, which avoid flattening the gold along the edges of the cut. The pliers should also be used for introducing the separate pieces into the cavity; "picking up" with the plugger, as in the use of gold cylinders, is impossible.

Solila gold is a pronounced cohesive gold, and, as such, is heated before insertion. This can be done directly over a clear flame, or, better still, on a piece of mica. The thicker numbers must be heated on both sides, and must, therefore, be turned. If overheated, the gold becomes rigid and less pliable.

For filling, the inventor of "solila" has manufactured special instruments. These have strong, thick handles, very much like the old-fashioned soft-gold pluggers. The extremities of these instruments are considerably larger than those of former gold pluggers, and have convex surfaces only. They are spherical,

hemispherical, and thumb-shaped, and some of them have the form of an inverted cone. There are slight serrations, not only upon the extreme end, but also upon the sides of the plugger, the principal purpose of which is to avoid any slipping of the instrument. It is best to use hand-pressure in inserting the gold. While it was customary, in the employment of gold-foil and cylinders, to execute a sharp pushing movement in a definite direction, and so to imitate the blow of a hammer, the movements required by the solila pluggers are more of a rotary, rocking, or rolling character. Accordingly, the operator will often grasp the plugger with the entire hand, and will thus be enabled to exercise a strong pressure with relatively slight exertion.

In beginning to fill a cavity, a piece of gold (No. 1 or 2), of about the size of the opening, is introduced with the pliers, pressed quite lightly with as large a plugger as possible, until it is firmly fixed in the bottom of the cavity, and then condensed, the instrument being rolled and rocked back and forth with strong pressure. It will at once be noticed, in doing this, how plastic the gold is, how closely it adapts itself to the walls of the cavity, and how it gives steadily in a lateral direction, without any tendency to roll or loosen. It is quickly condensed; even at the second or third pressure given it, the operator will feel a fully condensed mass under the instrument. The process is continued in the same way, laying on piece after piece and condensing. The pieces are very dense; a piece of the size of an ordinary gold cylinder represents about six times its quantity of gold. It is, therefore, customary to work with pluggers as large as possible, but the operator should not omit to go over the surface from time to time with fine instruments, employing equally strong pressure. If it is possible to make more marked depressions with these, such depressions should be filled up at once (preferably with No. 3), before proceeding with the coarser instruments. The movements in condensing should always be made from the centre of the cavity towards the edges; the latter should receive especial attention, and care should at all times be taken, that the gold may present a concave, never a convex surface. The old principle, applied to the soft-gold fillings, according to which the operator began at one wall of the cavity, then covered the other, and finally forced the last pieces into place in the centre, has, therefore, been wholly abandoned. We simply begin at the bottom and continue to work throughout the entire width of the cavity, until we reach the edges of the enamel. We then proceed, using No. 4 or No. 3, in the manner

described above, until the surface has the form desired. Even at this last stage, the operator should not fail to go over the ground with fine instruments and fill up any depression made in this way with small pieces of gold. The filling is finished precisely as in the case of gold fillings generally; it will be observed in this connection that the surface is very hard, and that working it down is a very slow process. Care should, therefore be taken, not to apply too much at any point in building up the contour. By reason of its even density, solila gold quickly becomes heated under friction, a fact which should be borne in mind, when using disks and other dry polishing instruments. The surface is capable of taking a very fine polish.

These are the suggestions which I am able to give with reference to the use of solila. So far as its qualities of endurance are concerned, it is true that we cannot, at the present time, allow ourselves any absolutely conclusive judgment; but there is not the slightest apparent reason to doubt them in any way.

In conclusion, I most earnestly recommend the use of solila gold. Those who have not succeeded heretofore in making permanent gold fillings, will likewise have small success with solila, and I warn every one against its use who believes that good gold fillings can be made with this preparation in unskilled hands without labor, without close attention, or without thoroughly preparing the cavity. But, on the other hand, I am convinced that any one, who has been working carefully and successfully with the previous preparations of gold, will make at least equally good fillings with this new gold in shorter time and with greater certainty, and that he will gradually venture with success upon complicated and difficult tasks that he would not have undertaken before.

Reports of Society Meetings.

AMERICAN ACADEMY OF DENTAL SCIENCE.

The regular monthly meeting of the American Academy of Dental Science was held at the Parker House, Boston, Wednesday January 1, 1896. Vice-President Dr. William P. Cooke in the chair. The paper for the evening was read by Myles Standish, M.D., Boston. Subject, "Light."

(For Dr. Standish's paper, see page 345.)

DISCUSSION.

Dr. Hamilton.—The only practical point that has not been touched upon which comes to me is the influence of the mouth-mirror. Dr. Standish may not know how much we have to use it. We work a great deal by reflected light,—that is, we look at the image of the cavity in a mirror. Now, we must see all parts of the cavity, and this we cannot do without the reflection, so we cannot possibly do without the mirror; but I would like to know if its constant use would have any effect on the eyes.

Dr. Standish.—I have never seen a cavity reflected by the mirror, but it brings up a point that I intended to speak of, and that is, the difference between daylight as it comes to us direct and by reflected light. A room that is very well illuminated by light reflected from the wall of a building is a poor light to work in. Schools are usually so arranged that the pupils get the best light, and the teacher generally has to face the windows, through which comes a flood of reflected light. Most of the schools are built in such a way that there is a narrow yard between the school and the next building, and they paint the wall white in order to get all the light possible. Now, that is a very different light from the light that comes to us direct, and it is a very poor light for anybody to work in. It is called a polarized light, meaning thereby that the rays are disarranged from their normal order.

About your mirror, do you have any shadows in your cavity,—that is, would the light reflected from your mirror be sufficient to destroy the shadow?

Dr. Hamilton.—I cannot say that I ever noticed that; I should say not.

Dr. Standish.—You are obliged to have a certain amount of shadow in order to get your depth, and to know exactly where you should place your instrument without being obliged to look too closely. If the illumination of the cavity by the mirror is sufficient to exactly counterbalance the light from the outside, then we have the difficulty that I spoke of in regard to working in a cross light.

Dr. Hamilton.—I hardly think that it can be called a cross light; if it is, then we have to learn to get used to it, as we are obliged to use the mirror almost constantly.

Dr. Bradley.—May I ask Dr. Standish if he would consider it working in a cross light, where your chair is in a bay-window, with a window on each side and the chair in the centre.

Dr. Standish.—I believe that is the reason why I am here to-night; I think Dr. Hamilton can tell you about that.

Dr. Hamilton.—I had a good deal of trouble with my eyes, and as my chair is in a bay-window, after trying a good many experiments, I found that it is best to work with your light coming from one window at a time, and I now have my shades pulled down and let up according as I wish to have light come from the left or the right side.

Dr. Standish.—When Dr. Hamilton came to me with a slight inflammation of the eyes, I inquired about the way he received his light, and when he said he worked in a bay-window, I told him that was the trouble, I had no doubt. Soon afterwards I met him and he said that the trouble had disappeared, and that he was taking more notice of where his light came from.

Dr. Williams.—That matter of bay-windows I tried myself several years ago, and after a short time I found that I could use but one sash; if I attempted to get the whole flood of light, I found that I got too much cross light, which I soon learned was very trying to the eyes, and so I decided that it was better to have a moderate light come from one source than to attempt to get a great deal of light from two or three sources, and I therefore shut off the light from one side when I wished the light to fall on my patient from another side.

I think Dr. Standish need not apprehend that he would be called "cranky" for his views in regard to the electric lights on our streets. I will read you a part of an editorial, which I clipped from the Boston *Transcript* the other day, which interested me so much at the time that I cut it out:

> "An English paper states that London oculists are up in arms against the very serious danger to the community caused by the electric light. Several eminent eye doctors are agreed on the point that unless a stop is put to the exposure of uncovered electric lights in the streets and in shops and offices, nearly all the population will become blind. Experts are so greatly exercised in the matter that they even suggest that Parliament should take it up, and prohibit the use of plain glass globes for electric lights, unless they be properly shaded."

Just what Dr. Standish has told us to-night, so he need have no fear that he will be looked upon as a "crank" for taking the position which he has in this matter in regard to these intense electric lights in the streets and stores. I have made it a subject for observation for some years, and, I think, we cannot be too careful, not only with regard to the kind of light, but the intensity of the light that we use for our work. If we look at nature, we find that she gives us the sunlight, which has a yellowish tinge, and under ordinary circumstances we can use our eyes all day without tiring them,

but in the arc light we have an extreme whiteness which is more like lightning. And, again, comparing with nature we find that lightning comes to us only in flashes and ordinarily from overhead. I had a conversation with one of the agents of the electric light companies when the light first came into general use, and he said that the competition was to get the most light possible. I replied, "You get too much light; such intensity must certainly be ruinous; our eyes are not fitted for such a degree of intensity, and the effects will soon show themselves." We also get too much strength in the incandescent electric light; that needs to be modified, shaded, or diffused in order to enable us to bear it. The Wellsbach gas light has more resemblance to the arc light in its blue or whiteness and is open to the same objection, but its steadiness is one thing in its favor. The new acetylene gas light I took a slight observation of the other day, and that seems to be more intense and whiter than anything yet in common use. I told one of the men there that that was not the proper ambition; what was wanted for the best welfare of the people was to get a strong, good light; one of such strength and color as to be non-irritating to the eye; that we had enough volume of light in its present condition. It struck me, unless they made some provision that the light should always be shaded and modified, there would be great detriment done to people's eyes. There is one club that I know of in Boston, where the reading room is lighted in a most injurious manner. Incandescent electric lights are strung around the room on a level with your eyes, and as you pick up a magazine to read, the light shines directly into your eyes and you soon find it uncomfortable. I went into the side entrance of one of our large variety stores the other day, and at the left, as I entered, there sat a man engraving glass, tumblers, etc. I looked in and saw that he had an incandescent bulb direct in front of his eyes. His eyes were perfectly red, as if he were a bloated drunkard. I stepped up to him and said, "My friend, you are ruining your eyes; you dull the optic nerve by having that light shine into your eyes" (another way of stating that he was using up the purple element of the retina), "and the only way for you to go on safely, if you want to save your eyes, is to put an opaque shade over it, and place it in such a position as to keep the light from falling on your eyes." He thanked me and seemed to appreciate the idea. I don't know whether he has profited by it or not. I have for years made it a practice in reading, etc., to have the light on my left side, and a little to the rear, and I also have it so arranged in my laboratory.

I think we are very much indebted to Dr. Standish for his very clear and practical and scientific illustration of this subject.

Dr. Smith.—I would like to ask Dr. Standish, How may we best treat the walls of our operating-rooms in order to avoid the possibility of any irritation which might result from light reflected from them? And, also, if an electric light of say thirty or fifty candle-power, properly shaded and placed over a roll top desk, would be injurious?

Dr. Standish.—Both of those questions recall points which I should have spoken of. The first people I saw who suffered from electric lights were book-keepers. With the usual desire for plenty of light and the usual disregard of where it comes from, they took one of these handy incandescent electric lights and hung it down on cords right before them, plumb over their books. The result was, as I have explained, a brilliantly illuminated surface in a dark room, and they suffered a great deal. It seems to me that almost anybody ought to know enough not to look an electric light in the face, and yet that is just about what a great many book-keepers are doing daily. You know the way most offices are arranged, the proprietor, who doesn't do anything with his eyes, usually has his desk up near the window; and the book-keeper, who is constantly using his eyes, is put into the darkest corner of the room. The book-keeper takes an incandescent electric light and puts it right down in front of him, and when he has a dark shade around it, he thinks he has the very best arrangement he can possibly get; but you can easily picture to yourselves the result of such an arrangement. The whole of that light is thrown down onto a square of reflecting white paper, and there the book-keeper sits during the whole day, with eyes attuned to darkness by the wall in front of him, looking at a brilliantly-illuminated square which is playing havoc with the retinal purple. He works there about six weeks and then he goes and sees the oculist, and the advice that I give—and I think I give it perhaps fifty times a year to book-keepers—is to have another light, and preferably a bright gas light, placed just above and behind their heads in such a way as to brilliantly illuminate the wall in front of them. With that modification they go along very well, and I think I can safely say that I know of one hundred book-keepers who have taken off their spectacles and have had no further trouble with their eyes, and all they did was to put this extra light behind their heads.

Another thing: a book-keeper who works continuously in an artificial light should not have white books; the paper should have

a slight tinge of yellow, so as not to have a white reflected light from the books. That would be a great advantage if you could only bring people to realize its value.

One of the great paper companies advertises to furnish special papers for books, and I hope they will be more generally used.

With regard to the light of the walls, I would say that I have had a curious experience in this matter. I never used to think anything about walls; there was nothing in the books about walls, and I had never heard them considered in the matter of illumination. But here was another instance where I learned something of value from the ordinary experiences of every-day life.

I had a series of patients, school-children, who came from Gloucester, Rockport, or somewhere out of town, and after six or seven of them had come from the same town, it occurred to me that they came from the same school; and so I made inquiries about the situation of that school. The facts were these: they had built a new school-house and made the windows as big as possible. On one side of the school-house was the ocean, and on the other side was a large pond, or an inlet of the sea, I forget which, so that the light came up reflected from the water on both sides. There was plenty of light without painting the walls at all, so they were left with the white skimming of ordinary plaster. It played so much mischief with the children's eyes that I advised the parents to take their children out of the school. Pretty soon a gentleman came in to see me and said, "I am a school committee-man from (wherever it was). We understand that you are advising the people to take their children out of the school because you claim that the walls are injurious to their eyes. Now, of course, we want to have everything about the school-house all right, and I would like to know what color we shall paint those walls?" Well, he posed me. I didn't know. So I thought a few moments and said, "Well, I'll have to consider that question and let you know later." I looked through the books again; I inquired of all my colleagues, and none of them seemed disposed to help me,—at any rate, I didn't get any practical advice, and so I started in from the scientific end to see if I could find out anything in regard to the irritability of certain colors on the retina. I found that at the red-yellow end of the spectrum the rays were all irritating, while the green and blue were not until you get away out into the violet, which is very dangerous. The deductions to be drawn from those investigations, therefore, were that if you want to paint the walls of a room so as to have the most light and have it agreeable. you

must put into a light color a tinge of blue or green. It is not necessary that it should be a pronounced blue or green, but just enough to take off the annoyance from a white wall. The thing was very prettily illustrated in my own case when I built a house at the shore. It was built on a high cliff, about sixty feet above the water, and when the sun is shining the light is strongly reflected from the water into the house. The house was not completed until some time in June, and we moved in without waiting for the walls to be painted, and the result was that we had trouble with our eyes that summer, so that by the next season we had the walls colored and there has been no further annoyance. In deciding on what colors to use, I went to a decorating firm here in the city and said that I wished to talk with some one about the proper colors to use in such a place. A man went down with me to the house to look at it from a decorative point of view. I did not say anything about my notions as to color, as I thought I would wait until I heard what his views were in regard to decoration. After looking over the situation, he said, "Well, we must paint these walls very differently from what we should in the city. In the city, we want to have all the light we can get, and here we have more than we want, and we will have to make a scheme of color very different for this place." And he went to work and laid out a scheme of color, and what pleased me most about it was that every single color that he put onto the walls of that house were purely blue or green, and he arrived at it from a practical, decorative stand-point, probably without knowing the reasons why such colors were the best.

I also had an opportunity for studying this thing when I moved into my new office. I wished to have the rooms as comfortable as I possibly could for the patients, and so I put onto the walls of the waiting-room a very pale, yellow-green. It is just about the color of the newest leaves of the Japanese ivy when they first come out, before they turn a dark green. It is a very light green, and the result is amazing. People come in there with irritable eyes and inflamed eyes and they sit there with their eyes wide open, in a room which has three windows and into which the sun is shining all the time. In my office up-stairs, where I meet the patients for consultation, I wished to have the room colored in such a manner that the light would not affect their eyes, and there I used a dark chocolate brown. That room you cannot illuminate with four gas-burners nearly as much as you can the one below with one,—in other words, those colors absorb the light,

and down-stairs there is practically no light lost, and yet my patients are just as comfortable in the waiting-room down-stairs as they are in the office.

Since this matter has been brought so much to my attention, I have had several conversations with educators in regard to school-rooms, and especially with a gentleman by the name of Stone, who is connected with the schools of Cambridge, who has given considerable attention to this subject. And they have a new school-house there which he has decorated, and on his invitation I went over to see it. The walls have less green than mine,—in fact, you would hardly know they were green if you did not look closely; and there is another peculiar feature about that school,—they have no black-boards. They are green-boards. The reason of it is that they noticed that many children complained of their eyes when they came to the black-board work. It seems there is a certain grade in the schools nowadays where the black-board is used a great deal, and they found that many children, who always managed to get along up to that period, would have trouble with their eyes, and they decided that it must be that the contrast was too great between the black-board and the white chalk, and so they had the boards painted green. They are dark, almost black, but still distinctly green. It is an experiment as yet, but so far, at least, it appears to be successful, and I hope it is going to prove the solution of the difficulty which brings so many children yearly to the oculist.

So if you wish to have a room well lighted, you should put into the color of your walls a tinge of blue or green; you can then have them fairly brilliant and still have them comfortable. If you do not want the light reflected at all and yet wish to have a color comfortable to the eye, then you must paint it a brown; but, of course, such a color would not be suitable in a room where you were going to do mechanical work. In my office it would be impossible to do comfortable work a few feet from the window.

Dr. Banfield.—I work by a west light, and in the summer-time, when the sun gets round so as to shine directly into my window, the light becomes too strong for either myself or my patient, so that I have had placed outside my window a cream-colored shade, and the light comes through that. And as it comes to me in that way it is bearable and comfortable to work by, and not only is this arrangement desirable for modifying the light, but it also keeps the sun off the window and reduces the heat.

Dr. Briggs.—Since Dr. Hamilton's trouble with his eyes, which

was supposed to have been caused by working in a bay-window, I have experimented to see if I found any difference in my own case, and I have not been able to find that it made such a difference as has been claimed for it. In the morning with the easterly light I do not get any cross light from my west window, because I am in the way of it, and in the afternoon, with the strong light falling direct on my work, as far as I can see, the light from the east window does not appear to be much of a factor in the matter.

It seems to me this peculiarity about the color of the walls is perhaps more of the key-note in these cases than we have realized, and I was wondering if that was not as much the trouble in Dr. Hamilton's case as the cross light. The walls of his operating-room have a very light yellow tint, which, according to Dr. Standish's remarks about color, is irritating,—my room is covered with a flock paper, of an olive color,—and it occurred to me that with all his shades up and the room a blaze of light, possibly this color might be the cause of his annoyance. I had never had any trouble with my light, but I was anxious to avoid trouble, and as I say, I experimented to see if it made any difference in shutting off my different windows, and I have not found it to be so.

I have very good sight, and the only trouble I have found has been in reading at night by electric light. I have lived in hotels for several years, and in reading there has been this slight annoyance that I speak of, nothing serious, but as my little boy expressed it, "your eyes look as if the sand-man had been round;" there was no marked inflammation, nothing but what would disappear by morning. For the last two months I have been out of a hotel and I have been using gas-light again, and I have had no trouble whatever, so that for ordinary purposes I have found that electric lights are very annoying to my eyes.

Dr. Robinson.—I would like to ask Dr. Standish if he considers an oil-lamp a good light to read by if properly shaded.

Dr. Standish.—There is only one objection to the oil-lamp that I know of, and that is the heat from it. The eye is always moist from its own secretion, and this heat affects the external layer of the eye by drying up this moisture, and it can be proved by examination to be injurious. But if your light is sufficiently good so that you can sit a reasonable distance from it, I think an oil-light is a very good light indeed.

The thanks of the members unanimously voted to Dr. Standish.

William H. Potter, D.M.D.,
Editor American Academy Dental Science.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, April 7, 1896, at the residence of Dr. J. Morgan Howe, 58 West Forty-seventh Street. The President, Dr. Benjamin Lord, in the chair.

The minutes of the last regular meeting were read and approved.

The President.—It was thought by the Executive Committee that it would not be wise to call upon the regular committees for reports this evening. We hope they will not be discouraged, because it must be felt by all that it is through these committees that this Institute is to accomplish its best work. We hope the time is not far distant when the committees will be called upon at regular intervals, and their reports thoroughly discussed and criticised.

COMMUNICATIONS ON THEORY AND PRACTICE.

Dr. W. St. George Elliott.—About two months ago one of the surgeons of St. Mary's Hospital came to see me professionally, and incidentally spoke of a boy under his care who had ankylosis of the lower jaw. He asked me to see the case, which I did; I was there during the operation, and it was most interesting. There was complete ankylosis on both sides. The boy was about ten years of age, a Southerner, but there was no history to be obtained of the case. There was imperfect development of the lower jaw, the symphysis being at least an inch back of its normal position. The operation consisted in forming a flap and going into and breaking up the adhesions of the joint, and with mallet and chisel cutting away the end of the ramus and entirely relieving it from its bony attachment. The result of the operation was rather favorable. I took an impression of the upper and lower jaws as far as possible. The mouth was fixed in a semi-open position, probably not quite half an inch, and through that small aperture I introduced a piece of board, on which was some impression compound, and succeeded in getting an impression of the upper and lower jaws. The lower jaw was so short that the lower incisors presented themselves almost horizonally. The general health of the patient was good and he made a very rapid recovery. The one object I had in seeing the case was for the purpose of making a spring splint to give the jaw a certain amount of motion so that it would not become reattached. This was found unnecessary, as the boy

voluntarily moved his jaw a good deal. The jaw was forced open an inch or an inch and a quarter. From that time up to the present he has continued to have fair power of mastication. The temporal muscle has been largely lost, but the other muscles continue in good form.

The President.—If there are no further communications on theory and practice, we will listen to the paper of the evening, and I have the great pleasure of introducing Professor A. A. Breneman, late Professor of Industrial Chemistry in Cornell University, who will address us on some of the physical properties of the metals, and as all dentists are supposed to be metallurgists—more or less—we may consider it a great favor to have our attention called to the subject by one who has given it special study.

(For Professor Breneman's paper, see page 355.)

The President.—I am sure all will agree that Professor Breneman has given us much general information on the properties of metals, and the subject is now before the meeting for discussion, inquiry, and criticism.

Dr. Elliott.—I would like to ask Professor Breneman whether it is possible to make an alloy that is perfectly homogeneous, one in which the relative component parts are the same and remain the same in all parts of the ingot.

Professor Breneman.—That is an interesting question, and it touches the phenomenon of *liquation* or the separation of the elements of the alloy during cooling. The matter of preserving perfect uniformity in the mass of some alloys, however carefully and thoroughly they have been made, so that they shall remain exactly the same after cooling, is a difficult one. There is a tendency in the more fusible elements in a liquid mass to separate themselves as the less fusible portions become hard, and so to gather in the centre of the mass, the part last to cool, and there to form a mixture or compound of different composition from the portions first to cool. This has been the bugbear of metal-workers in many different lines. The prevention of it depends in special cases upon special devices; no general method can be given. If the cooling mass within its mould could be continuously shaken during its cooling we should probably have the best approach to uniformity in the mass, but this is generally impracticable. Frequently a slight change in chemical composition will reduce the tendency to separation. Some processes of working metals are based not upon preventing, but upon encouraging this tendency. The tendency of the ingredients to separate during the hardening of a liquid

mass is common to all forms of matter. A familiar case is that of water in freezing. It has long been known that the impurities in a freezing mass of water are pushed together so as to concentrate in the portion last frozen. This was a serious difficulty in the early operation of artificial ice-plants. If the water was not thoroughly purified the ice at the centre of the block, or the portion last frozen, would contain impurities sufficient to injure the entire mass of ice. The remedy for this, in the case of artificial ice-making, is, of course, to have the water as pure as possible. The water should be distilled, and distilled under conditions which will regulate its purity. To return again to what happens in a cooling mass like this, I should say that as the molecules build themselves up into a solid state, often into a crystalline state, the more fusible portions, which will also be the more mobile under those conditions, may be crowded out, as it were, and escape through orifices left in the hardening mass.

Dr. E. A. Bogue.—Is there any way by which metals so widely different in the melting-point as silver, tin, and zinc may be alloyed and made homogeneous?

Professor Breneman.—The question is somewhat complicated by bringing in three metals. There is no inherent difficulty brought in merely by wide differences of melting-point. Metals that differ most widely in their fusing points may very readily alloy. The difficulty when it occurs is one depending rather upon an unknown physical peculiarity of the metal, and if it cannot be conquered by the use of another metal which serves as a mediator between the two it is difficult to conquer. Certain metals in very minute proportions will effect a kindly union of metals otherwise apparently incompatible. In certain cases this may be merely a reducing action, where the mediating metal serves to reduce portions that exist as oxides and keep the metals apart, keeping their surfaces from uniting. This, I think, is the most general explanation of this mediating action, but it is an entirely general explanation. The day may come when tables may be made in which, with the proportions of the elements varying uniformly on a scale of equal parts, we may find without experiment the properties to be expected from mixing given proportions of metals.

Dr. S. E. Davenport.—I should like to ask Professor Breneman whether there is a scientific foundation for what I seem to have observed within the past few weeks, or whether I have allowed my imagination to run riot. During my professional life I have been using the so-called redistilled mercury supplied in the various dental

depots for amalgamated alloys. Recently it has seemed to me a matter of sufficient importance to make an effort to get the mercury purified to a greater degree, and I have succeeded in interesting a chemist in the question. He has supplied me with mercury as pure, he says, as it is possible to make it, using some peculiar processes which, no doubt, Professor Breneman knows all about. As I have been using the same alloy, for most of my amalgam fillings for more than ten years, it seems to me that I ought to be able to recognize even slight changes. With this purified mercury the color of the filling is improved, less mercury is needed to in corporate the filling, and the mixed mass seems more homogeneous and finely granular.

Professor Breneman.—Perfectly clean mercury is very difficult to obtain; primarily because of metallic impurities which, while they are mainly separated by distillation, are not so easy to separate absolutely; and minute traces of foreign metals may greatly affect the qualities of the mercury. Perfectly clean mercury is necessary in many physical experiments. When we confine a mass of mercury and measure its volume in a graduated scale we want the mercury to make a sharp meniscus, as it is called,—that is, to curve upward. If it contains impurities, or if the tube is dirty, the mercury instead of making a clean upward curve will be almost flat in its surface within the tube. To purify mercury we resort, first of all, to distillation and redistillation; but sometimes we find that a small quantity of impurity will persist even after distillation. There is a peculiar power existing in certain liquids of carrying over as they boil the vapors of other liquids which in themselves have a much higher boiling-point; a great deal of one vapor will carry over a little of the other, and that little may be a harmful quantity. There is also greasy matter, probably some hydrocarbon-oil which has a boiling-point near that of mercury, therefore very difficult to separate by distillation; and such impurities may very much impair the value of mercury in use. Where distillation does not answer, chemical purification may be resorted to. The action of dilute nitric acid, while it will dissolve a very little of the mercury, will dissolve all of the contaminating metals. Other oxidating solutions, like sulphuric acid and bichromate mixture, will serve. Sometimes there are minute mechanical impurities which can be gotten rid of by filtration through cotton under pressure, or through a thin layer of porous wood under high pressure. Generally chemists find one or the other of these means to answer the purpose, but sometimes many means have to

be adopted, and occasionally it is extremely difficult to get thoroughly clean mercury.

The President.—Will Professor Breneman tell us whether he thinks aluminum will come into use in the arts or in manufactures to any considerable extent?

Professor Breneman.—I think that until we have a cheaper method of manufacturing aluminum it cannot possibly displace the use of iron to any great extent, although there are many cases in which its lightness and its beauty, and its freedom from attack, are elements worth paying for. The production of electricity—and aluminum is manufactured by a process of electrolysis—is at best an expensive process. Even when power in such quantities as is supplied at Niagara Falls is to be had it is not procured for nothing. The great tunnel, the immense power-houses, the tremendous dynamos set up at Niagara for the making of aluminum and other things cost a great deal of money and the wear and tear is great. Besides that, the ores from which aluminum is made at present are not very abundant nor very cheap. While common clay contains aluminum in great quantities, there is at present no practical method of separating it from the clay. However cheap the raw material may become, it is unlikely that any process of working it by electricity, a process which uses carbon poles, themselves rapidly destroyed, which uses an agent requiring expensive machinery, and which makes its products by the single ton instead of by hundreds of tons, will ever be a dangerous competitor with iron manufacture. Aluminum to-day costs, by the cheapest process, about fifty cents a pound. It will be seen that the interval which separates it as a competitor from iron at a cent and a quarter a pound or less is very great.

A vote of thanks to Professor Breneman for his very interesting and instructive address was given.

Adjourned.

S. E. Davenport, D.D.S., M.D.S.,
Editor The New York Institute of Stomatology.

Editorial.

AFTER-THOUGHTS.

It is not unusual for writers of papers to generalize upon insufficient data, or, with positive results, reach conclusions not at all warranted, and, in degree, foreign from the real issue sought to be elucidated by elaborate experiments. This is a fault common to all scientific workers, probably without exception. The nature of this work tends to a certain optimistic view, and, in a measure, clouds the intellectual powers for the time being, then follows a period of rest, and the individual finds that his enthusiasm has carried him beyond legitimate conclusions. Hence, after-thoughts often lead to explanations that detract materially from the original work, as it leads to a feeling in many minds that, inasmuch as the generalization has proved so defective, therefore the facts deduced from elaborate experimentation must be equally faulty. Such a conclusion is, probably, never warranted. Individuals are very differently constituted. The exact investigator, capable of guarding against failure in the minutest detail of his work, may be mentally incapacitated from drawing correct conclusions as to the general effect of the facts secured. It is questionable whether many are so thoroughly mentally rounded that they are equally capable in both these directions. Readers of journals must have had this forced upon their notice, but while it certainly remains a part of human limitation it in no sense discredits good work.

The effect that these crude conclusions have is, however, injurious in that they influence many minds who, attracted by the original brilliant results, will read, but will probably never see, or, if they have seen, will not heed the after-thoughts which may modify the earlier conclusions. In this way erroneous ideas become fastened on our profession, influencing each one of us for good or ill in daily practice.

The illustrations of this are many throughout dental literature, but it is not often that more marked examples are observed than in two very prominent and recent cases, both of which have greatly influenced the thoughts of the active minds in dentistry, possibly more so than in any other direction in many years. We allude to

that incisive and, in many respects, the most influential paper recently published upon the etiology of pyorrhœa alveolaris, by Professor C. N. Peirce, and also to that other series of papers by Dr. G. V. Black begun in the *Dental Cosmos*, May, 1895, the most elaborate in experimental details of probably any other in the past decade.

In the paper of Dr. Peirce we have certain results given with a positiveness of assertion born of a thorough conviction that the observations support the author in his hypothesis, and it must be said of the writer of that paper that he has not, so far as we are aware, changed his opinions or modified his conclusions, but this cannot be said of all who have coincided with him. The editor of the *Dental Cosmos* was one of the earliest and warmest supporters of the "gouty origin" of pyorrhœa, and of the results obtained by the chemists aiding Professor Peirce, but he has so recently modified his views (editorial, April, 1896) that some who have never favored that theory have cause to wonder whether the foundation of this hypothesis has not been rudely shaken.

In the original paper by Professor Peirce the following tests were given:

"1. The hydrochloric acid test. 2. The dry or the destructive distillation test. 3. The murexid test." The editor of the *Dental Cosmos*, in the February number, 1894, thus writes of these experiments: "*Careful analysis, both chemical and microscopic*, of concretions from or near the apices of tooth-roots, in typical pyorrhœa cases *demonstrated the uniform presence of uric acid and its salts. This fact alone* is of the *utmost significance*, for by it we not only are confronted with a *fundamental chemical difference in the two classes of concretions*, . . . but we are furnished with a valuable confirmatory evidence of their difference in origin." (Italics ours.) Yet we find, notwithstanding this complete endorsement of Professor Peirce's experiments, that in an article, September, 1894, the editor, in drawing some distinctions between the work of Dr. Black and that of Dr. Peirce in this direction, makes this remark, "It should be noted in this connection that the murexid reaction is purely a qualitative test for detecting the presence of uric acid, and gives but an imperfect basis for its quantitative estimation." In an editorial in the April number, 1896, he uses the following language: "The strong probability is that *the methods of analysis pursued by the experts who did the work for Dr. Talbot were inaccurate. The murexid reaction is easily obtained* where we have to deal with considerable amounts of uric acid or its salts. The case is quite different when minute traces of these compounds are to be detected. The directions usually

given in the books for detecting uric acid by the murexid test are, as a rule, *faulty when applied to the material under consideration.*"

While the editor subsequently disclaims any intention of reflecting on the skill of the chemists or the honesty of Dr. Talbot, it seems to our comprehension that he certainly does the former.

If, then, the murexid test is so faulty, what becomes of all that has previously been said in relation to uric acid and its salts in connection with pyorrhœa? It would seem that the work heretofore done must all be repeated, and we think, in justice to Dr. Peirce and those who side with him, that the editor of the *Dental Cosmos* should explain what constitutes a positive test for uric acid, that thereby we may all be benefited. As the case stands at present, it looks very much as though it had resolved itself into discrediting the witnesses on the other side to sustain an untenable hypothesis. We do not care to entertain this view of it, but certainly some explanation is needed, or it may be thought, by careless readers, that the Chicago experts in chemistry are unworthy of credence. This we are not prepared to believe, but fear that the difficulty may be found in the fact that the report of the Chicago chemists has been very unsettling, requiring an effort at explanation. What the profession desires is the truth in the matter, and cares very little for the personal side of the controversy.

A further illustration of our heading may be found in two quotations given from the pen of Dr. G. V. Black, the first from the May (1895) number of the *Dental Cosmos.* We took occasion, at the proper time, to criticise the following assertion as being calculated to mislead and unsettle well-established principles of practice, and we are pleased that Dr. Black felt the necessity of making a subsequent explanation. His after-thought in this case is decidedly his best thought from our point of view.

On page 416 of the aforesaid number will be found this remarkable statement: "*There is no basis for the supposition that some teeth are too soft or too poorly calcified to bear filling with gold or other metal in use for that purpose, since all are found to be abundantly strong.*" (Italics ours.)

His after-thought is expressed in a paper read before the New York Odontological Society, in January last, *Dental Cosmos*, April, 1896, in which the following good advice is given: "*We are not always justified in making a gold filling immediately for a sensitive child* simply because the tooth is sufficiently strong. *The condition of the pulp of the tooth may not justify such a course, or even the dentine may be too sensitive.*"

When properly explained, there is really no conflict between these statements, but the first, left as it originally stood, became a stumbling-block in the way of many an earnest practitioner.

No intelligent person can contend against frequent differences in the mental view of things. The unchangeable person is not a proper part of the close of the nineteenth century, but would seem to be a mental left-over from the fifteenth. This article, therefore, is in no sense a criticism of these changes, on the contrary, it would seek to emphasize the importance of after-thoughts whenever there has been a tendency to overstate results. That which seems to be most needed is that greater care should be taken in our experimental work, so that it shall be nearly free from inaccuracies, and thus avoid, as much as possible, immature conclusions, especially where they conflict with established clinical experience.

ELECTRICAL OSMOSIS.

This new form of treating sensitive dentine is justly claiming a large share of attention. The earlier efforts in this direction and the conclusions reached have been confirmed by subsequent experiments.

Dr. Jack gives us a very practical paper in this number, and Dr. Brown, of Montreal, has supplemented his able paper of April with additional facts.

In an interesting clinic given to a few deeply-interested observers by Dr. Jack, we were impressed by two facts,—first, the possibility of carrying the agent used—in this case cocaine—through apparently dense dentine. The case operated upon was that of an inferior bicuspid, abraded to an even surface, but exquisitely sensitive, so much so that the touch of the finger produced a painful shock. The current was turned on carrying a twelve-per-cent. solution of cocaine, and in a short time all sensation disappeared. The excavator demonstrated, however, that this obtunding was superficial, and a second application was rendered necessary, but with entire success.

The point of interest here, outside of the loss of sensation, was the fact that an abraded tooth means an almost certain increased calcification of the tubuli and a supposed increased resistance or, in any event, a greater obstacle to osmotic action, but in this instance the result was entirely satisfactory and quickly produced.

The second case was a large superficial cavity on the buccal surface of an inferior molar. This required twenty minutes, but a perfect obtunding was the result. The singular fact was developed that these teeth, insensible to the excavator, quickly responded to thermal change by the use of cold water.

The time has not yet arrived when the question can be answered, what effect will this treatment have on the pulp? The danger, if danger exists, will be in that direction. Theoretically the paralyzing effect of the cocaine should, in some cases, result in an eventual devitalization of the pulp. As the action seems to be superficial, this could only occur in cavities with a thin layer of dentine over the central organ.

The experience that some have had in the production of great pain, seems to have been the result of inadequate instruments or methods of manipulation, for with the apparatus described by Dr. Jack it would seem impossible that, with ordinary care, this could occur.

Another complaint made is the time taken out of an operator's hour, from twelve to twenty minutes. This is, apparently, a serious objection, and yet it is only apparent, for the time lost struggling with a nervous patient, to say nothing of the unending strain upon the dentist, more than counterbalances the delay, for the time lost is fully made up by subsequent rapidity of execution.

There is another difficulty yet to be considered, and it is by no means a slight one, the danger of filling over an exposed and temporarily obtunded pulp. This in careless hands will certainly be of frequent occurrence. Notwithstanding the many doubts surrounding this new method, the outcome will be awaited with increasing interest.

SOLILA GOLD.

Having received numerous inquiries in regard to this gold, we have felt it to be of sufficient interest to have reproduced in this number Dr. Theo. Frick's paper, published in the March number of the *Schweizerische Vierteljahrsschrift für Zahnheilkunde.* Dr. Frick's long connection with that journal,—which we regret to notice has been recently severed,—and his thorough training both in Switzerland and the United States, give his article a special value.

This gold, manufactured by Dr. E. de Trey, of Basel, has slowly been making its way. Our attention was first called to it some

two years since. An examination of the sample led at that time to the impression that it probably possessed all the characteristics of crystal or sponge gold, for years familiar to the profession. The interest manifested in it recently, both in England and on the continent, seems to indicate qualities not possessed by older forms. Whether this is true remains to be demonstrated.

A JOURNALISTIC WAR.

The Ohio *Dental Journal* has been for some time endeavoring to correct the bad habit of a prominent trade journal for the offence of quoting without proper credit. This is such an old affair that we have long since ceased to notice it or to expect anything better.

Our objection to the course pursued by the *Items of Interest*—the journal especially condemned—is not so much a loose way of crediting, but the unjust method adopted in that journal of dividing an article into fractional parts and publishing as though these were distinct papers. This no editor is justified in doing, as it is a positive wrong done the author. If a journal must take its matter from other journals, let it be with justice to all concerned.

Trade has very devious methods, and it cannot be expected that the morality of any trade journal will rise any higher than the source of its power.

Bibliography.

Lehrbuch der Conservirenden Zahnheilkunde. Von W. D. Miller, a.o., Professor an der Universität Berlin: Mit 420 Abbildungen. Verlag von Georg Thieme, Leipzig, 1896.

Professor Miller in this volume presents the dental profession in Germany a book on operative practice. It is difficult to harmonize this new character with what has previously been accomplished by this distinguished and tireless worker. It is rare to find one interested in pure science capable of bending to the seemingly petty details of operative work with pleasure or even contentment, and still more would it seem difficult for such a person to write a book on such subjects. It is to Professor Miller's honor that he is thus

capable of unbending and giving of his practical knowledge for the benefits of students and others who may require it.

The first chapter, after the introduction, is devoted to the treatment of the hard tooth tissues without filling. This includes several well known processes. He gives due credit to Dr. Stebbins for his work in introducing nitrate of silver, published in the INTERNATIONAL DENTAL JOURNAL, 1891. This is followed by methods of separation after the mode adopted by Dr. Arthur.

The second chapter is devoted to "The Filling of the Teeth." Filling-material occupies necessarily many pages. This is followed by sterilization, handling of the instruments, and from these subjects, by proper gradations, with full and explicit directions, is the student led up to the preparation of cavities and filling by various methods in crown and root-canals.

The treatment of a number of pathological conditions closes the book of 416 pages. For the purpose intended, that of a text-book to students in operative work in Germany, it is certainly practical and shows the author to be one of those many-sided but rare men willing to give aid in any direction when most needed.

ELECTRICITY IN ELECTRO-THERAPEUTICS. By Edwin J. Houston, Ph.D., and A. E. Kennelly, Sc.D. New York: The W. J. Johnston Company, 253 Broadway, 1896.

This compact book of four hundred and two pages is, as expressed by the authors, "intended to meet a growing demand which exists not only on the part of general medical practitioners, but also on that of the general public, for reliable information respecting such matters in the physics of electricity applied to electro-therapeutics as can be readily understood by those not specially trained in electro-technics."

There are but few men, it is presumed, better trained for such a work than Professors Houston and Kennelly, and, therefore, those who may feel that they require such a book will find theories, instruments, and processes fully and clearly explained.

Electricity, in its various forms, has become so much a part of medical therapeutics that the practitioner in the several branches of the healing art must make himself intelligent upon it, and so familiarize himself with its technicalities that he will be able to use the current with safety and precision.

The present prospect is that in the very near future a dental office not fitted with all the electrical appliances necessary for use in running machinery, lighting the oral cavity, the reduction of

sensitive dentine, etc., will be regarded as being very imperfectly furnished. It is, therefore, quite essential that dentists should begin the study of electrical science, and for a beginner no better book could be taken in hand, as it covers all the important knowledge necessary for a dentist to acquire in the direction of his daily practical work.

Dental Pathology and Practice. By Frank Abbott, M.D., Professor of Dental Histology, Surgery, and Therapeutics in the New York College of Dentistry, etc. With ninety-seven illustrations. Philadelphia: S. S. White Dental Manufacturing Company, 1896.

This work of two hundred and forty pages is a somewhat unexpected addition to the literature of the subjects treated, as the writer was not aware that any such contribution was in anticipation. The unheralded birth of a new book is not, however, a fault but rather a subject for praise, as thereby undue disappointment is avoided.

The author makes no pretension to having covered the entire subject of dental pathology, for he says, "Such an exhaustive, treatise would assume proportions which would discourage any but the most ardent student in dental surgery."

The book opens with an abstract from Bödecker's "Dental Anatomy and Pathology," giving the views of Heitzmann and Bödecker on development of teeth. This seems to the reviewer to be an unsatisfactory method for an author to pursue. The reader anticipates, upon opening a book of this kind, to, at least, have the author's views upon all topics, and that these should occupy the prominent place in the production.

From Chapter II. to IX., one hundred and two pages, the following subjects are considered: Odontoblasts in their Relation to Developing Dentine, Growth of Enamel, Teeth of the Lower Jaw at Birth, Congenital Defects of Enamel, Studies of the Pathology of Enamel, etc., Caries of the Human Teeth, Children's Teeth and their Treatment, Microscopical Studies upon the Absorption of Roots of Temporary Teeth. It will be seen by these quotations from headings that the subjects considered have been those which have largely occupied the attention of the author for some years; indeed, these chapters are the papers read upon various occasions upon the topics named. The illustrations accompanying the text have been made familiar by previous production in the dental

periodicals. These, while carefully and artistically prepared, do not satisfy the critical mind; in fact, are out of date as compared with the photo-micrographic work which, while oftentimes imperfect, leaves no room for cavilling. The author has given in the chapter on "Caries of the Human Teeth" three pictures of this character: 1. Carious Enamel (longitudinal section.) 2. Carious Dentine (longitudinal section.) 3. Carious Dentine (cross section). Whether these represent the views of the author or those of Miller must, for the present, be left to the intelligence of the reader, but they certainly do present more satisfactorily the conditions observed under the microscope than any pencil can give held by human hands.

The chapter following those named is upon filling teeth. Why this is introduced into a work on dental pathology will have to be answered by the author, but it seems to the reviewer that the time has passed when everything pertaining to dentistry can be included under one general heading. Dentistry has grown beyond that adolescent period, and each work should be strictly confined to its proper subjects.

The author does not favor the rubber dam, for he writes, "After having tried more or less faithfully every devise ever brought to my notice for keeping moisture out of cavities during operations, I finally returned to the use of small pieces of linen," but for building up crowns with gold he still has use for the rubber dam.

In the chapter on "Alveolar Abscess" there appears the following sentence: "In the great majority of cases the successful treatment of alveolar abscess is one of the simplest operations we have in dental surgery." This is a somewhat surprising statement in view of the fact that an abscess at the apex of any root means a necrotic condition of the cemental tissue, and that, in its turn, means a continued irritation and an incurable condition, except by excision of the dead portion, a process not mentioned.

The author is not disposed to call pyorrhœa a disease, but rather a condition. His idea is that it begins "in the mouths of children who habitually neglect their teeth," and that by forty years, "the teeth will have become loose, their sockets nearly or quite destroyed." Another cause of pyorrhœa is "mercurial poisoning." Excessive deposits of calcareous matter on the teeth are not, in his opinion, a cause of pyorrhœa. The treatment is mainly the "removal of all foreign substances from the roots of teeth" and "nature, 'the great restorer,' will do the healing of the soft parts."

The chapter on "Facial Neuralgia" is a lengthy one. That on

"Hyperostosis of Roots of Teeth" was published in the *Dental Cosmos* of 1886, and is given entire here, with the illustrations.

Four other chapters conclude the book: Conditions of Patients during which Severe Dental Operations should be avoided, Stomatitis, etc., Contribution to the Knowledge of Tumors of the Jaw, Senile Atrophy of the Upper Jaw.

While the critic cannot quarrel with an author for declining to consider, in a book devoted to dental pathology, all the subjects usually regarded as being included in that branch of dental teaching, it does seem as though this book, nevertheless, is not properly named, inasmuch as it is quite as remarkable for the things left unconsidered as for the character of those for which the author desires special attention.

It is to be regretted that the book is not of a more practical character. Dental teaching to-day needs a work of this kind on dental pathology more than upon any other subject; but it is feared this cannot become a text-book in colleges. Its place will be in the library as a work of reference.

Obituary.

DR. PHINEAS G. C. HUNT.

Dr. Hunt died at Indianapolis April 24, in his sixty-eighth year, of heart complications.

He was born in 1827, in Champaign County, Ohio. After passing through the preliminary training at school, he began the study of dentistry with his brother in Indianapolis. His practice extended over forty-five years in one community, a length of time in one place not often exceeded.

Dr. Hunt early discarded the narrow prejudices prevalent at the beginning of his career and took an active part in all the educational movements, which have since made dentistry worthy the name of a liberal profession. He introduced many valuable devices in dentistry and was a frequent contributor to dental periodicals.

The honorary degree of Doctor of Dental Surgery was conferred upon him by the Ohio College of Dental Surgery in 1870. The honorary degree of Doctor of Medicine had been previously conferred by the Indiana Medical College.

He was elected president of the American Dental Association in 1872, and was also elected president of the Indiana State Association in 1861, and was made presiding officer of the Indiana State Board of Examiners, which position he continuously held.

He was one of the trustees of the Indiana Dental College, in which his son, Dr. George E. Hunt, is professor of Dental Pathology and Therapeutics.

Dr. Hunt was a thirty-third degree Mason and had held high offices in that body.

Of four brothers, three of whom were dentists, the subject of this sketch was the last to die, and in his departure the profession of Indiana and the country at large will miss an earnest, liberal worker, unfailing in his efforts to carry his chosen profession to a broader conception of its duties.

PAUL DUBOIS.

We copy the following from a fly-leaf in the March number of *L'Odontologie*, Paris, giving the sad intelligence that this prominent worker in dentistry met a sudden death by an accident in April, the particulars of which are not given:

"P. Dubois, the distinguished editor of this journal, the devoted president of the General Association of Dentists of France, the learned professor of the Paris Dental School, died April 8, at Saint Germain en Laye, the victim of a terrible accident.

"The obsequies took place on Saturday, April 11, at Carrières Saint Dennis, in the midst of a large concourse of his colleagues and friends."

Dr. Dubois, as editor of *L'Odontologie* and as professor in the Dental College of Paris, earned an international reputation. The journal under his leadership secured a standing in the world of dental literature possessed by but few journals. While this will, doubtless, be continued with marked ability by the editorial staff, the readers will miss the energetic and able work of the editor-in-chief.

His professional labors in the furtherance of dental education have been continuous, and have, without doubt, been productive of the good results which follows all earnest efforts.

DR. LEONARD R. KOECKER.

Dr. Leonard R. Koecker died May 6, 1896, at his residence, 1302 Walnut Street, Philadelphia, after a short illness. Very few, it is presumed, in the dental profession, even in Philadelphia, were familiar with Dr. Koecker except by name. He has not taken any active part in dentistry outside of practice for many years.

Dr. Koecker was born in Philadelphia, July 16, 1822. His father was the celebrated Dr. Koecker, who, it is believed, wrote the first book on dentistry published in the United States, and so frequently quoted in later works. The son, after graduating in medicine at the Jefferson Medical College, in 1842, chose the practice of dentistry as a profession, and continued in this as his life work, retiring from active practice some ten years since, thereafter devoting himself principally to literary pursuits.

For years Dr. Koecker has been known as a collector of rare and valuable prints, and a choice collection of his is the nucleus of the famous Claghorn collection, now owned by Mr. Walters, of Baltimore.

It is said of him that his reputation as a wood-, paper-, and metal-worker long ago extended beyond this country, and that some of the finest gems in bookbinding and illustrating ever seen were exhibited by him at the Centennial Exhibition in Philadelphia in 1876. It is also said of him that as a metal-worker he was frequently called upon by the United States government to decide questions of great delicacy involved in the construction of intricate and sensitive pieces of machinery.

A widow and two children survive him.

RESOLUTIONS OF RESPECT—DR. W. H. DWINELLE.

Whereas, in the death of Dr. W. H. Dwinelle the American Academy of Dental Science loses an esteemed Honorary Fellow, whose long and active life has been of unusual benefit to our profession; therefore be it

Resolved, That the American Academy of Dental Science hereby records its sense of sorrow in the death of Dr. W. H. Dwinelle, being a loss to our society as well as to our whole profession.

That to his family we extend our sincere and heartfelt sympathy.

That upon the records of our society the above be recorded in affectionate memory, and that a copy of this be sent to his family.

(Signed)

T. G. W. Werner,
Eugene H. Smith,
Charles H. Taft,
Committee.

March 31, 1896.

Current News.

PENNSYLVANIA STATE DENTAL SOCIETY.

The next Annual meeting of the Pennsylvania State Dental Society will be held at Bellefonte, July 7, 1896, continuing for three days.

Victor S. Jones,
Corresponding Secretary.

Bethlehem, Pa.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

The Pennsylvania State Dental Examining Board will hold its next annual meeting at Bellefonte, Pa., July 7, 1896.

Wm. E. Magill, Erie, Pa.,
President.
J. C. Green, West Chester, Pa.,
Secretary.

CHICAGO DENTAL SOCIETY.

List of officers of the Chicago Dental Society for 1896–97, elected at the annual meeting, held in Columbus Memorial Building, Tuesday evening, April 7, 1896:

President, Louis Ottofy; First Vice-President, J. E. Hinkins; Second Vice-President, H. A. Costner; Recording Secretary, A. H. Peck; Corresponding Secretary, Geo. B. Perry; Treasurer, E. D.

Swain; Librarian, H. A. Gunther; Member Board of Directors, G. H. Cushing; Board of Censors, G. T. Carpenter, B. D. Wikoff, G. W. Schwartz.

GEO. B. PERRY,
Corresponding Secretary.

NORTH CAROLINA STATE DENTAL SOCIETY.

THE Twenty-second Annual Meeting of the North Carolina State Dental Society will meet at Morehead City, on June 17, 18, and 19, 1896. The first session of the Society will not be called to order until Wednesday morning, June 17.

The State Board of Dental Examiners will be held on Tuesday, the 16th, for the examination of all applicants for license. All persons desiring to come before the Board are requested to be present on Tuesday at ten o'clock, in order that all examinations may be completed by Wednesday morning.

J. E. WYCHE,
Secretary.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE American Dental Society of Europe will hold its twenty-first meeting at Dresden, Germany, August 3, 4, and 5, 1896. All members of the profession who plan to be in Europe at that time are cordially invited to attend.

Further information can be obtained of the president, Dr. John H. Spaulding, Paris, or of William A. Spring, 26 Christian Street, Dresden.

THE FIFTY-FIRST ANNIVERSARY OF HORACE WELLS'S DISCOVERY.

THE fifty-first anniversary of the discovery of anæsthesia by Horace Wells was observed by the Quonehtacut Dental Club with a banquet at the Hotel Heublein, Hartford, on the evening of December 11, 1895. There were present Drs. E. S. Gaylord and D. A. Jones, of New Haven; C. Fones, A. C. Fones, and C. W. Strang, of Bridgeport; Chas. P. Graham, of Middletown; W. J. and W. H.

Rider, of Danbury; Edw. Prentis, of New London; J. Tenney Barker, of Wallingford; and Jas. McManus, Geo. L. Parmell, Henry and Charlas McManus, of Hartford.

The invited guests were Hon. O. Vincent Coffin, governor of Connecticut, and Mr. Charles T. Wells, the son of the discoverer of anæsthesia.

INTERSTATE DENTAL MEETING.

A meeting of the General Executive Committee of the Interstate Dental Meeting was held in Kansas City, at which each of the four States (Iowa, Nebraska, Kansas, and Missouri) was represented, and the following action taken: The place and time of the meeting was fixed at Excelsior Springs, Missouri, June 23–26, 1896. Dr. Henry J. McKellops was chosen supervisor of clinics, to be assisted by Dr. L. K. Fullerton, Iowa, Dr. O. M. Heustis, Nebraska, Dr. C. B. Reed, Kansas, and Dr. H. S. Lowery, Missouri.

Much enthusiasm was reported from all the States, and it is believed that this will be one of the greatest dental meetings ever held in the West.

J. P. Root,
Chairman.
S. C. A. Rubey,
Secretary.

THE

International Dental Journal.

VOL. XVII. JULY, 1896. No. 7.

Original Communications.[1]

EMPYEMA OF THE ANTRUM OF HIGHMORE.[2]

BY FREDERIC C. COBB, M.D., BOSTON, MASS.[3]

EMPYEMA of the antrum of Highmore has been for years well known to surgeons both in this country and abroad, but was considered rare on account of a want of comprehension of its symptoms. Jourdain, Deschamps, Cooper, and Desault in the eighteenth century had described it, and Deschamps had even advised catheterization of the antrum by the normal orifice, a piece of advice, however, much more easily given than followed. The antrum was already opened through the canine fossa by Lamourier and Desault, while the alveolar process had been used as a point of approach by Meibomius and Cooper. These cases were of the acute and violent type, and were rare as they are at the present time. In the records of the Massachusetts General Hospital for the last twenty years I can find but about a dozen cases, and they are all of much the same character. The patient usually entered the hospital complaining of great pain and soreness over the antrum. On examination the whole side of the face was found to be red, swollen, and tender, and perhaps fluctuating at some point below the orbit. The question

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the American Academy of Dental Science, March 4, 1896.

[3] Assistant Physician, Throat Department Massachusetts General Hospital; Physician to Throat Department, Boston Dispensary.

at first arose as to whether the inflammation were in the antrum or external to it and in the soft tissues only. Carious teeth were now looked for and extracted when found, and the antrum was washed, the fluid entering at the sinus and passing out of the alveolar opening thus made. The antrum was then packed, or perhaps curetted, and the patient allowed to leave the hospital in a week or ten days, with directions to wash the cavity daily through the alveolar opening. Unfortunately most of these cases occurred so long ago that it is hopeless now to follow their history. No mention of any nasal examination is recorded in any of the older ones, but in most of them carious teeth play an important part. No allusion is made to a possible specific cause, although in the light of our subsequent cases it should, I think, always be considered. Several of these cases occurred in young children from five to seven years of age, and show that where rhinitis persists in childhood antral disease should be thought of. All these cases were, of course, of a violent type and usually not difficult of diagnosis. It is only, however, in the last ten years that the attention of laryngologists has been drawn to a milder form of the same affection. Within the last few years much has been written about the antrum and other sinuses, and light has been thrown upon many obstinate cases of rhinitis which were formally considered incurable. When we read the reports of the cases I have mentioned it is hard to realize that the disease, as we meet it in laryngological and in surgical clinics, is the same, and that its different symptoms are simply due to the occlusion or patency of the antral orifice. These milder cases we may call latent empyema, or blennorrhœa of the antrum, and instead of the violent symptoms complained of in the form of which I have spoken, are usually signalized by a discharge of a more or less purulent character from one or other nostril, usually accompanied by a foul smell, unlike the smell of ozæna, to the patient himself. This discharge may, of course, be bilateral if both cavities are involved, but is not usually so. With this history there arises a consideration of the conditions which may give rise to a unilateral nasal discharge, and these are a foreign body in the nostril, syphilitic disease, and empyema of one of the accessory cavities. On examination of the nose we find the passage clear, thus eliminating foreign bodies from our list. If there is no sign of syphilis, no necrosis of the septum or perforation of its bony wall, we can rule out nasal syphilis with probability. We are then left with an empyema of a sinus, and must make a careful diagnosis as to which accessory cavity is affected. We have to consider in the

order of frequency antral, frontal, ethmoid, and sphenoid empyema. Disease of the antrum is by far the most common, probably on account of the connection of that cavity with the teeth, many authors believing that it is ten times as frequent as empyema of any other sinus. Of course, the first point to be looked for is the location of the discharge. If pus is seen issuing from under the middle turbinate, the diagnosis is simplified, since the frontal sinus, the anterior ethmoidal, and the antrum have their outlets in that region. The nostril should therefore be carefully cleansed and wiped dry with a pledget of cotton, and then the point of issue of the pus carefully noted. If the pus comes from under the middle turbinate, we next have to differentiate between the antrum, the frontal, and anterior ethmoidal cells. This is often a difficult matter, and many expedients have been resorted to in deciding which cavity is affected.

The presence of necrosed bone in the ethmoid region and the location of the pain may determine the diagnosis in favor of that cavity. If these signs are wanting, we are left to make a diagnosis between frontal and antral empyema. The location of the pain is here not absolutely reliable, for frontal pain is met with in empyema of the antrum. We may find redness or tenderness over the frontal sinus, and it is recommended to probe the sinus through its opening in the infundibulum. If this fails the anatomical exits of the sinuses may be taken advantage of for the purpose of diagnosis in the following way: As the frontal and ethmoidal have their openings at their lowest parts, while the antral opening is at its highest part, it is evident that the two first sinuses are best drained when the head is in an upright position, but the antrum when the head is inverted. The patient is therefore directed, after his nostrils have been wiped clear of pus, to put his head between his knees, and if, after a few moments, on assuming the erect position, the nostril is found full of pus, it has probably come from the antrum. The method of transillumination by putting a small electric lamp in the mouth and darkening the room is sometimes useful, as is shown in the cases to-night. Transillumination, however, does not always give certain results, for the variation in the thickness of the walls of the antrum may be considerable, and the skin may be too thick to transmit light well. If these methods fail recourse must be had to exploratory puncture by the lower meatus, canine fossa, or alveolar process. The former is preferable, in my opinion, for the following reasons: First, the wall is usually very thin, and, second, there is little or no reaction-

ary inflammation. I have found, in perforating through the canine fossa, an immediate swelling of the cheek, which much distorted the face for some days. The passage of the canula was painful and seemed to increase the swelling. The alveolus is often thick and therefore more difficult to use as a means of approach. It is, however, on account of its connection with the lowest part of the cavity, and on account of enabling the patient to wash out his own antrum, rapidly becoming the favorite location for puncture. In two of my cases, after an exploratory opening had been made in the lower meatus, carious teeth having their roots in the antrum were extracted and the cavity washed through their sockets, but in both cases the patient preferred to have the washing continued by the lower meatus. If it is decided to puncture by the lower meatus a strong trocar should be introduced below the lower turbinate and turned obliquely outward as far as the nostril will allow, and then pushed through into the sinus. Often, however, the bone is too thick to permit of this proceeding; it is therefore better, I think, to use a trephine or bur propelled by a dental engine. When the trephine has entered, this is at once felt by the sudden lack of resistance, and it is withdrawn, a canula of the same size fitted to an aspirating syringe introduced, and some of the contents of the antrum removed. For accurate diagnosis this proceeding is better than at once washing out the pus, because the fluid passing over the middle meatus may carry with it pus from the infundibulum, which has not necessarily come from the maxillary sinus. Usually the first washing is accompanied by a very considerable discharge of intensely foul-smelling pus. Ziem has, however, reported very slight amounts of pus from apparently plain cases of empyema, and I have noticed, in two of the cases reported to-night, so little discharge on puncture that the diagnosis seemed to me at the time uncertain, although the result of treatment appears to me proof positive, for the foul discharge improved after the first washing of the antrum and ceased in a short time, although it had lasted many weeks before the puncture. If the pus be too thick to be drawn through an aspirating tube, washing is in reality the only method of ascertaining its presence. In such cases the nostril should be carefully wiped out before washing the antrum. The odor from pus in long-standing antral empyema is almost unbearable, and one can easily understand the distress its constant presence in the nose must cause the patient. Frequently in suspected cases at the time of observation no pus is seen in the middle meatus and the surgeon is obliged to make the patient lower his head in the man-

ner already described, so as to drain the antrum. Often the patient's history—that pus appears when he lies on the sound side—will give the observer a hint as to the best way of obtaining the discharge. I have found a peculiar thin brown mark on the handkerchiefs, a valuable guide to diagnosis which I have not seen described in papers on the subject. This stain has disappeared in the cases treated and cured, and much lessened in those constantly washed. In one case, where nothing could be seen in the nostril and yet a constant thin brown spot on the handkerchiefs appeared, a probe wound with cotton was inserted under the middle turbinate, and on being removed the stain on the cotton and on the handkerchiefs was found to correspond very well. The antrum was opened through a tooth-socket and washed and cured, the stains disappearing from the handkerchief after a few washings.

The opening was allowed to close eight months ago, and there has been no recurrence of discharge or stains since. Mackenzie has suggested that the pus discharge be examined for bacilli, and this has been done, with as yet no important results as regards diagnosis. The staphylococci pyogenes aureus and albus and citreus, and the pneumococcus of Telamon-Fränkel, have been found, the latter of interest since pneumonia is recorded as having followed antral disease. The prognosis in cases as regards time of continuance is not of the best, an untreated suppuration lasting many years or through life. It may give rise to many complications directly due to an affection of its neighboring organs or structures, and indirectly to disease of distant organs. Of the neighboring organs the eye is perhaps most frequently affected, and we have iritis, panophthalmitis, narrowing of the field of vision, orbital abscess, and lid abscess, all following empyema of the antrum. Of the skin of the face, facial abscess and pyodermatoses are mentioned, while in ear and throat acute otitis media (from entrance of pus into the Eustachian tube) and peritonsillar abscess (probably from the passage of pus over the tonsillar region) have been noted. In more distant organs we find reported pneumonia, lung abscess, arthritis, and nephritis. In none of the cases shown by me have any of these complications occurred. As to the question of treatment of empyema of the antrum there is much diversity of opinion. In the fulminant cases there is no question that a wide opening and drainage are imperative. In latent cases, on the other hand, the results of brilliant surgery do not seem to be as gratifying as in some other localities. It goes without saying that the cause must be carefully sought if we are to cure the con-

dition. The most common causes of empyema of this sinus are, I think, in the order of frequency, carious teeth, nasal obstruction, and syphilis. Other less frequent agents of suppuration are foreign bodies in the antrum, such as supernumerary teeth or cotton pledgets introduced into tooth-sockets by the dentist, from thence escaping into the antrum. A rubber drainage-tube has been found as an exciting cause, and had remained some years in the antrum before its discovery and removal. Epidemic influenza seems to have played a prominent part in many cases. In most of my patients the teeth have been an important factor, and in two of them antisyphilitic treatment has decided the diagnosis. I think we may say at present that empyema of the antrum is an obstinate disease, and requires the greatest persistence on the part of both physician and patient. There is, of course, a limit where patience ceases to be a virtue, and mild methods must give place to more energetic surgery, but the fixing of this limit must be dictated by personal experience. Some of my cases were cured in a short time,—two or three weeks,—some after several months, and others are still under treatment and relapse when the washing is intermitted.

With regard to the location of antral puncture authorities differ, although the weight of opinion seems to be in favor of the alveolar opening. Most of my cases have been washed through the lower meatus, although some have been washed through the canine fossa and the alveolar process. The advisability of a large or small opening into the antrum is still in dispute. Most surgeons believe in the former, while Ziem, with his enormous number of cases, advocates the latter. He, however, makes up for the smallness of the opening by using a powerful pump, which sweeps the antrum out under pressure as it were. Bosworth, on the other hand, advises making an opening in the alveolar process large enough to admit the little finger and thoroughly exploring the antrum. This certainly seems a most rational method of procedure.

Case I. Empyema of the Antrum.—Mrs. Jessie B. Family history negative. Has seven children, all living and all well. Has had no diseases except dyspepsia. Seven years ago she had a yellow discharge from the nose consequent on a confinement, the only abnormality of which was the bursting of a vein (in the leg). The nasal discharge from the first was yellow and thin. She has been subject to headaches on the same side of the head. The headaches and discharge have persisted ever since. Examination

shows pus issuing from the region of the middle turbinate. Examination with the probe shows the presence of necrosed bone in the middle turbinate. Transillumination with the lamp in the mouth shows the antrum on the right side bright, while that on the left side is opaque. Therefore a diagnosis of antral empyema on the left side was made. As to causation nothing definite could be learned. There was no history of specific trouble, nor of anything pointing to tuberculosis. There were no carious teeth. With a trephine an opening was made into the antrum by the lower meatus, and a copious discharge of pus was the result. The pus was very thick, heavy, and of a very foul odor. A straight canula was introduced, and the antrum washed out every morning by Dr. Chenery, into whose service she came. The operation was accompanied with but little pain, and was not followed by any discomfort whatever. On July 18 she reported herself better than for years as regarded the discharge. The wound below the lower turbinate was covered with a small membrane, as is usual in such cases, but otherwise the nose was unaffected. The antrum was washed out for some time, but approaching confinement interrupted the treatment, and she passed out of observation.

Case II.—William C., age seventy-three, came to me complaining of an offensive discharge from the right nostril and pain on the same side over the antrum. He gave the following history: Three years ago he had a toothache on that side, and the dentist extracted the second upper molar on the right side. Soon after this he had neuralgia on and about the antrum of the same side. Subsequent to this he had no neuralgia until the ten days preceding his visit to me. On examination he had an intermittent discharge of pus from the right nostril of an offensive character perceptible to himself. His pain was severe, and the discharge very annoying. Examination showed no pus in the region of the middle turbinate, but a probe wound with cotton and passed up under it was stained a yellow-brown, like the stains on his handkerchiefs. Transillumination was negative. The question now arose as to the soundness of the first molar on the affected side. The dentist to whom the patient was sent decided that the tooth was not the occasion of the antral disturbance; the patient was not operated on therefore for another week or more; but as the discharge still continued and the pain persisted, the tooth was extracted, its roots being found to be in bad condition after extraction. The socket was washed out, and the canula introduced into the antrum a day later, with only a slight discharge of pus.

The patient's general condition being very poor, he was advised to go South on a sea-voyage on March 27. He returned on April 15, stating that the discharge had been increased by the damp air and that the pain was great. The pain was not present in the night, but came on in the morning and lasted all day, to subside in the evening. There was a slight amount of swelling over the antral region, but otherwise the previous examination was unchanged. After a second consultation with the dentist, it was decided to bore up through the tooth-socket, which had healed up in the patient's absence on his vacation. After the tooth-socket was reopened by Dr. Hamilton, the antrum was regularly washed out, at first once a day, and subsequently every second day. From the first the offensive discharge ceased, but not so the pain, which, however, was greatly lessened. On damp days the pain was at its worst, but usually yielded to clearing the antrum out with antiseptic solutions. On April 30 he was almost free from pain, but the plate which had been put in to keep the opening clear annoyed him. The intervals of washing were lengthened, but as the wash-water still contained pus, it was not deemed safe to remove the plate until July 22, when the water washings came away for some days perfectly clear. The result was awaited with some anxiety, but there was no return of the nasal discharge, although there was slight pain on damp days. Of the antiseptics used, peroxide of hydrogen yielded the best results in a weak solution at first, but afterwards in the fifteen-volume solution. It was always followed by an alkaline solution. The patient has been heard from within a few days, and has no pus discharge, but the pain, on damp days, occasionally appears. I believe this to be a neuralgia of the infraorbital nerve, as it is not associated with any antral symptoms.

CASE III.—H. C. P., aged forty-one, entered the Massachusetts General Hospital November 21, 1894, complaining of a yellow discharge from the left nostril. The discharge is said to be thick, yellow, and foul. There was headache over the frontal region, but only in the afternoons. He gave the following history: Three months ago he had a "cold" in both nostrils, accompanied with a thick purulent discharge on each side. This affected both eyes, making them red and watery. This discharge had lasted for two months. Before entrance the discharge on the right side had subsided somewhat, but still persisted. At no time did he feel any symptoms of pressure, or anything like it. On examination, a large granulating middle turbinate was seen, with pus oozing from under it. The nostrils were otherwise normal. This, of course, suggested

an empyema of the antrum, and further investigation of the teeth showed an open socket of the second molar tooth, the tooth having been extracted months before. With an antiseptic probe the socket was explored, and it was found to connect with the antrum. The antrum was at once washed out, and the relief was immediate. This treatment was continued every day, and at the end of a few weeks the patient learned to do this himself, and, when seen some months later, stated that the opening had nearly closed up, and, although he washed it out occasionally to keep it clean, gave him no trouble. This case was interesting from an etiological standpoint, as it apparently started from the cold, being bilateral at first. It may seem that the bilateral discharge was due simply to a rhinitis, but the time is rather long for a simple inflammation. The second point of interest is the condition of the middle turbinate. The amount of granulation tissue was so large and exuberant as to suggest malignant disease, and the rapid subsidence under washing of the antrum was very marked.

CASE IV.—Nellie M., aged twenty-one. Patient entered the hospital October 14, 1895, complaining of an offensive discharge from the right nostril. This was especially bad in the morning, but more or less disagreeable during the day. She gave the following history: Two months ago, after a severe cold, she had pain over the antral region of such severity that it kept her awake for three successive nights. A sudden and copious discharge of pus was followed by relief of pain, although the soreness and a slight swelling persisted until she came to the hospital. There were no other symptoms of importance except, perhaps, a paræsthesia of the throat, acid or highly-flavored food distressing her. Examination showed a normal condition of the nostrils, except that from under the middle turbinate of the right side oozed a small stream of pus. This and the symptoms preceding the examination made disease of an accessory cavity probable, and the question arose as to which one was affected. Transillumination showed the antrum dark on the right side, while on the left it was brilliantly illuminated. An examination of the outside of the antrum showed some slight tenderness and swelling. There was no pain on pressure over the frontal region. The teeth were next examined and found to be perfectly sound, so that it was decided to make an opening into the antrum through the canine fossa. This was done, on October 5, with a small trephine run by an electric motor. The antrum was washed out, a moderate amount of thin pus appearing in the wash-water; but, owing to the inexperience of the patient, the

first wash-water was swallowed, the head being held too far back, so that much may have been lost. The next day the patient felt much better; the discharge was less offensive. The face had swollen somewhat during the operation, as is common, and in my opinion an objection to the canine fossa opening, and on the following day the disfigurement was very obvious. Passing the canula into the antrum was very disagreeable. The antrum was washed out with an alkaline antiseptic solution until November 9, when the opening was allowed to heal, as all the symptoms were very much improved, and the passage of the canula was very painful. Two days later she returned, complaining of a slight increase in discharge, which subsided rapidly, and on November 25 she had no discharge. On December 22 there was no discharge, or symptoms of any kind, and they have not since recurred.

The lessons taught by this case are that opening by the canine fossa is an unsatisfactory procedure, since the swelling of the soft tissues, which is apt to follow any trauma in the cheek, is very disfiguring. The opening is not easier to get into, it seems to me, and the pain to the patient is considerable. It also tends to show that an antrum which has lasted but a short time requires a comparatively short time to heal when washed out and kept clean. April 8, patient has been seen, and has had no return of symptoms of any kind.

Case V.—Christina D. Patient came to hospital October 27, 1895, complaining of a foul discharge from the left nostril. She gave the following history: Eight years ago her teeth were much decayed, and they were removed by an unskilful dentist, who left many roots in the gums, over which a false set of teeth was placed. A year ago she had pain and tenderness over the left antrum, with swelling in the canine fossa. About the same time pus began to flow from the left nostril, staining four or five handkerchiefs a day at the time she entered the hospital. The throat and left nostril were normal, but pus was seen issuing from the right nostril in the region of the middle turbinate. Transillumination showed darkness of left antrum, while the right side was brilliantly illuminated, and there was marked tenderness over the canine fossa. She was sent to the dental infirmary, where the roots of the teeth on the left side were extracted by Dr. Paul. No discharge of pus, however, followed the extraction of the teeth. On the 30th of October an opening was made through the left nostril with the trephine and electric motor, and a quantity of the most foul-smelling pus evacuated. The next day the improvement in the symptoms was

marked. Instead of four or five handerchiefs, she had but two, and the character of the pus discharged was much less offensive. The patient was very anæmic, and iron, arsenic, and strychnine were prescribed. On the 4th of November the pain had quite subsided, and a much smaller amount of pus was evacuated. On the 11th of November peroxide of hydrogen, diluted one part to three of water, was used, followed by an alkaline wash. This resulted in a decided improvement, and on November 27 very little pus was found on washing. On December 3, on lowering the head, a few drops of pus were found in the nostrils, and two days later no pus was found on washing out the nose. The patient came at first every day, and, as the discharge improved, at less frequent intervals. On December 12 the patient had so little trouble that she stayed away, contrary to advice, until December 26, when the opening into the antrum was found to have healed. A return of the symptoms necessitated another puncture and renewed washing. She is still under treatment.

Case VI.—Constance B. Family history negative. Patient entered the hospital in October, 1895, complaining of great pain over the antrum, but had no discharge. She gave the following history: The first time she had any trouble was in May; then the teeth of the lower jaw were inflamed, and she could not easily open her mouth. She had had no nasal trouble, or any specific history. She had been admitted to the hospital in August with a swelling over the antrum, but no discharge. While here she received thirty grains of iodide of potassium, and in three weeks was discharged with entire subsidence of symptoms. Less than a month after leaving the hospital she noticed a swelling and pain over the antrum, and resorted again to iodide, but with no relief. At last, some months later, she went to a dentist, who extracted a molar and washed out the sinus, finding pus, but only temporarily relieving the pain. Before entrance the eye had begun to protrude. The head was sensitive to the touch on the scalp, and the headaches were worse at night. Examination of the nostrils was negative, except for some enlargement of the middle turbinate on the left side, but no pus was seen oozing from under it. The socket of the second molar was open, but on passing a probe into the antrum no pus was discovered, although the antrum appeared full of some rather soft tissue. Transillumination of the antrum showed a marked darkness on the left side. The remaining teeth were healthy. The question now arose, what was the cause of the intense pain? An empyema simply it was not, for the probe failed to find pus, and

relief of the pain did not follow the washing out of the cavity. The diagnosis lay, therefore, between syphilitic and malignant disease of the antrum. In favor of the latter was the failure of iodide to act after the patient left the hospital, and a progressive loss of flesh and strength. In favor of the former was the subsidence of the symptoms in the hospital under specific treatment, the tenderness of the scalp, the headaches worse at night, and the absence of hemorrhage on probing. Dr. Warren made an exploratory opening, and found necrosed bones without any signs of sarcoma. The necrosed bone was removed as far as was possible, and the pain at once ceased. She was given iodide, and discharged, doing well.

Case VII.—Maurice K., aged seventeen, clerk, entered the hospital December 4, 1895, complaining of a discharge of three weeks' duration from the right nostril, excoriating the right side of the upper lip. There was no pain and no odor and no constitutional symptoms. The right side showed darker than the left on trans-illumination. There was some atrophy of the turbinate, but no tenderness over the antrum or malar process. The diagnosis was made by an exploratory puncture, and only a small amount of pus removed. The antrum was washed several times, and on December 9 the discharge from the nose had ceased and the patient felt much better. The excoriation of the lip was nearly healed. On the 10th there was no more discharge and the treatment was discontinued. After a few days he was discharged, with orders to report if the discharge should reappear, but has not since been heard from. It seems to me that this was an acute catarrh of the antrum, as shown by the one-sided discharge and excoriation of the lip under that nostril. Its duration had been so short that it yielded readily to treatment.

Case VIII.—Lizzie M. Patient has had considerable trouble with the teeth of the upper jaw for several years. The last three molars were removed some time ago, and the second bicuspid is at present necrotic and painful. This symptom occurred over a year ago and has persisted since. With the nose she has no trouble. Two weeks she had a sharp pain over the antrum, accompanied with fever and chills, with pain in the back and limbs. These acute symptoms lasted about a week, and were relieved by a purulent discharge from the left nostril about ten days before entrance. Examination showed pain over the antrum and a discharge coming from under the middle turbinate. The second bicuspid was carious as I have stated. An exploratory puncture was made under the lower turbinate with the trephine, and foul-smelling pus evacuated. The patient is still under treatment by washing with antiseptics,

and has gained several pounds in weight and very much in general health. The discharge has not ceased, although it has much improved. Besides washing out the antrum the patient has had the carious tooth removed, and the socket was found to connect with the antrum. The interesting points about this case so far are the rapid improvement under antral washing and the fact that the bicuspid tooth connected with the antrum,—a fact not very common. So severe was the apparent cachexia that I had a small polyp, found in the middle meatus, examined microscopically in order to bar out the diagnosis of sarcoma. This growth was found to be benignant. This patient has gained ten pounds, but treatment is still necessary.

June 20.—Patient's discharge has entirely ceased.

Case IX.—C. M. D., aged twenty-two, entered the hospital complaining of a foul discharge from the left nostril. Patient has had trouble with his teeth on that side for two or three years, and the left second molar had been especially tender for two weeks before the onset of his symptoms. With his nose he had hitherto had no trouble. He had had no trouble of a specific nature, nor any family history of tuberculosis or new growths. Five days before entrance his acute symptoms began with sharp pain over the antrum, and severe headache and chills. The headache was over both temples and accompanied with high fever. At this time there was no discharge from the nose. These symptoms subsided as soon as the left nostril began to discharge a foul-smelling, thin secretion. The nasal discharge stained his handkerchiefs a brownish-yellow color, and was copious enough to necessitate the use of four or five handkerchiefs a day. He had still some pain in the temporal region and soreness over the antrum. Examination showed the left upper third molar to contain a large cavity, but otherwise the teeth appeared to be sound. The nostril showed pus in the middle meatus both under and over the middle turbinate. The lower turbinate was pushed over towards the septum, making the breathing space narrower than normal. There were no lesions of the skin to be seen. Transillumination of the antrum showed a marked difference in the light transmission of the two sides, for the left antrum does not transmit light as the right side does. Puncture through the lower meatus gave rise to a discharge of thin and very foul pus. The discharge after the first washing began to improve, but the pain persisted for a few days. He was washed at first every day, and later, as the symptoms improved, every second day. At present the discharge is slight and the wash-water comes away almost clear. He has been washed with peroxide, followed by Seiler's solution,

but this has been given up as possibly too irritating. He seems to have received the greatest relief from injections of iodoform in solution in glycerin. So far I have not considered it wise to stop the washing on account of the well-known liability to recurrence.

March 16.—He has had no washing for two weeks, but I have inserted the canula to keep the opening patent. He has now no pus discharge and considers himself well.

April 8.—Patient has been seen to-day, and has no discharge or pain since March 2, and has not had his antrum washed or treated since that date.

June 15.—Patient is still perfectly well.

THE PRINCIPLES AND APPLICATIONS OF CATAPHORESIS.[1]

BY WENDELL C. PHILLIPS, M.D., NEW YORK.[2]

The subject of cataphoresis, or the cataphoric action of electricity, is by no means new. It was known and used to some extent before the present generation was born. The use of the electrical current in anæsthesia was known as far back as 1859. If any of you care to look up the matter, you may refer to articles in the *Medical Times* for February 12 and June 25, 1859, by Dr. Richardson. You may learn something of the anæsthetic effect of the continuous current as used by him; not, however, with the use of the remedies that we use at this time, but with aconite and chloroform. It is recorded that he performed, among other things, one or two extractions, and it is reported that the operations were done without pain. I would also refer you to an interesting article by Dr. Frederick W. Peterson in Bigelow's "International System of Electro-Therapeutics," which is the latest book on the general subject of electricity that we have. Later on we have most admirable articles by Dr. Henry W. Gillett,[3] of Newport, upon the subject of obtunding sensitive dentine. Then you will find much useful information upon the general subject in the paper recently published

[1] Read before the Central Dental Association of Northern New Jersey, March 16, 1896.

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[3] Dental Cosmos, February, 1896; INTERNATIONAL DENTAL JOURNAL, February, 1896.

in the *Dental Cosmos*,[1] by Dr. William J. Morton, who has presented the matter in his usual intelligent and accurate manner. Allow me to give you three definitions of cataphoresis. That of Dr. Peterson is as follows: "Cataphoresis is the introduction of medicaments by means of electricity into the body through the skin or mucous membrane." In the light of recent developments his definition is not complete, for we have established the fact that medicaments can be introduced into the hard tissues by means of electricity. Dr. Morton's definition is: "The movement of fluids, together with the substances they may hold in solution, from the positive pole of electrodes conveying a continuous current in tissue towards the negative pole." Dr. Gillett modifies these two by including the teeth. It seems to me it might well be described as the introduction into both the hard and the soft tissues, by means of a continuous current, of fluid medicaments from the positive pole without the breaking up of their constituent elements.

You will naturally have to consider, in the study of cataphoresis, two other properties: one is osmosis, the other electrolysis. Osmosis may very well be demonstrated by a simple illustration, which is by no means new. We will suppose that you have a jar of fluid something like this (drawing on black-board). Into this jar of fluid you place a porous diaphragm, which divides it into two compartments. You put into one compartment one kind of fluid, and into the other compartment another kind, the two fluids having different densities. The lighter fluid will pass through the porous diaphragm to the fluid of greater density, as may be easily seen if the two fluids are of different colors. This passing of a fluid through a porous diaphragm, or similar intervening medium, to unite with another fluid, is what is called osmosis. Now, if you drop into the lighter of the two fluids the positive pole of a continuous current of electricity, and into the other fluid the negative pole of the continous current, and turn on the current, you will find that the osmotic action will go on with much greater rapidity than before; the electricity hastens the osmotic action of the fluids. That is cataphoresis. Cataphoresis is electrical osmosis, or osmosis hastened by the action of the continuous current. Not only that, but having two fluids, one denser than the other, you may, by reversing the poles of the battery, overcome this natural osmotic action and cause the denser fluid to pass towards the lighter, instead of the lighter flowing towards the denser. Therefore, you may keep in your minds

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[1] Dental Cosmos, January, 1896.

this simple fact, that cataphoresis is nothing more than electrical osmosis, and it is purely a mechanical process.

Electrolysis and cataphoresis are both brought about by the same kind of current under somewhat similar conditions. But you have to bear this in mind, that where you attempt electrolysis you use different remedies and different electrodes. Electrolysis means the electrical decomposition of chemical compounds. If you take an oxidizable metal, like copper or zinc, for the positive pole, and put it in contact with living tissue, there will be oxidization of the copper, which will remain in contact with the tissues. In cataphoresis you use an electrode that is not readily oxidized. Platinum or gold should be used in the cataphoric introduction of medicaments.

The question will come up, Why do we use a continuous current? Continuous current and galvanic current mean the same thing, but the term continuous current is preferable. It is better than the term galvanic current, for the reason that you do not use it for galvanism all the time. There are many illustrations that might be used to demonstrate the difference between cataphoresis and ordinary osmosis. One is to take two pieces of blotting-paper, putting some preparation like pyrozone on one and staining the other with permanganate of potassium; place the two pieces end to end and observe the osmotic effect: the pyrozone will pass into the end of the permanganate of potassium piece of paper for a line or two, illustrating the osmotic action. Now, if you apply the positive electrode to the pyrozone side and the negative pole to the permanganate side, a rapid decolorization will take place, showing that the current is driving the lighter towards the denser fluid, and much further than would be done by ordinary osmosis.

Again, if you place the positive pole, which we may speak of as the dry pole, to one end of a hard-boiled egg, and the negative pole to the other end of the egg, you will see the fluids collect at the negative pole. One of the most recent theories that I may call to your minds to explain the cataphoric process is that there must be a movement of fluids from the positive towards the negative pole, and that, as the fluid moves, there are little vacuums formed, and the fluid medicament rushes in to fill these vacuums. I do not know whether it is true or not.

I am frequently asked if it is possible to have both electrolysis and cataphoresis simultaneously. In all cases of cataphoresis you do get some electrolytic effect at the same time. Electrolysis and cataphoresis are almost always combined; but when cataphoric electrodes are used, the electrolytic effect is so slight that it is not

perceptible. An illustration of this combined action may be seen if you place a copper or a zinc electrode in contact with a piece of meat. There will soon be a deposit of oxides in the meat and at the same time there will also be some movement of these oxides into the mass of meat. Now, as far as the oxidization of the electrode is concerned, that is electrolysis, but the moment you get any movement, as the result of the breaking down of this metal, towards the negative pole, that movement is cataphoresis.

In cataphoresis, the quantity of the medicament introduced will depend both upon the strength of the current used and upon the density of the tissue. The less the density of the tissue the more of your medicament you will be able to introduce, and the stronger the current the more medicament you will be able to introduce.

In order to fully understand the measurements of the current we use the words volt, ampère, and ohm. For a long time they were to me great bugbears. I will try to explain them to you. The voltage of a current means its pressure, and by ampères we measure the flow or quantity. For illustration, suppose you have a tank of water on the roof of a house, with an outlet down near the ground. When the water is flowing, the amount of water that comes out of the stopcock would represent the ampères, and the pressure of the water in the tank would represent the voltage of your current. Whatever resistance there might be to the flow of water would be represented by ohms.

Cataphoric Medication.—In speaking of cataphoric medication no attempt will be made to touch upon its relations to general medicine and surgery, as time will not permit. The transactions of the American Electro-Therapeutic Association for the past few years, Bigelow's book, to which I have already referred, and the recently published articles on this general subject in the various medical and dental journals, will give you sufficient information along this line.

Cataphoric medication is of great interest to you in its relations to dentistry, and one of its most important applications is in the obtunding of sensitive dentine. In this word "obtunding" you have a term that is most appropriate. No term used by physicians really expresses the idea so well as this word obtunding. There are several uses to which cataphoresis has been applied in dentistry, but to my mind the most important application of it is the obtunding of sensitive dentine. It would be foolish for me in this presence to undertake to go into the details of obtunding sensitive dentine. You will find them set forth in Dr. Gillett's articles already referred

to, and which you have all doubtless read. I have witnessed the application of the electric current with cocaine for this purpose, and in many cases where it was very successful, and you have in this agent a means of doing your work with the least possible discomfort to the people who come under your hands. I do not believe you dentists fully realize the extent of the suffering and the nervous dread that prevails among your patients. If you could fully realize the nervous tension to which they are subjected and the dread of the operations they undergo in the dental chair you would not hesitate to adopt any means which gives hope of relief from pain, and it would seem before many months your patients will begin to demand that your operations be done by this method.

Another application of it has been made in connection with crown- and bridge-work. It has also been applied in several instances to obviate the pain in the extraction of teeth, and very favorable reports of its use in such cases have been given. In the obtunding of sensitive dentine we have the best and most practical illustration of the actual application of cataphoresis that mankind has yet made use of. Heretofore dentists have really had nothing that they could honestly say would obtund sensitive dentine. Now by the application of the continuous current cocaine can be introduced and made to do this successfully. So far as I have been able to make out, the practical application of the continuous current in the obtunding of sensitive dentine and the bringing of this question before the dental profession in such a way that the profession can understand it and make use of it is due to Dr. Henry W. Gillett, of Newport, and the credit belongs to him.

I have made some use of cataphoresis in the line of my special work in the nose, throat, and ear. At the Manhattan Eye and Ear Hospital I have a case of suppurating antrum of Highmore in which a test was made. This patient gave a peculiar history. You know that Professor Garretson held that most, if not all, cases of antrum disease are due to caries of the teeth. I have seen so many cases of suppuration of the antrum where the teeth gave every evidence of being perfectly sound that I am fully convinced that a considerable proportion of these cases have nothing to do with the teeth. This case was a man who was a watchmaker by trade, and every day at about ten o'clock he had a profuse discharge of pus from the right nostril. That was about the only symptom.

In his occupation of watchmaker he began to work about nine o'clock in the morning, with his head over the bench, in which position the normal opening of the antrum, the ostium maxillare,

would be in the dependent portion, and after he was working an hour or so pus would begin to flow out. Percussion over the region of the antrum on both sides revealed some tenderness on the right side. He was then taken into a dark room[1] and transilluminated with this little electric lamp, and found the reflected light much dimmer on the affected side underneath the eye, and from these indications I made up my mind that there was suppuration of the antrum. A cataphoric application of a ten-per-cent. solution of cocaine was made to the canine fossa, using the Wheeler fractional volt-selector. After fifteen minutes, during which time the current was gradually increased to fifteen volts, an opening was made into the antrum without pain to the patient.

It is hardly necessary for me to say that after the opening was made there was a profuse discharge of pus. You can also use the continuous current in this manner for the obtunding of soft tissues.

For extraction there should be used a double positive electrode upon each side of the tooth, and the negative electrode upon some other portion of the body.

Cataphoresis has been used in the treatment of pyorrhœa alveolaris and other suppurative diseases, necrosis, and various kinds of ulcers. You can use it with various remedies to destroy germ-life, also for sterilizing and bleaching, and there are new applications of it yet to come. Enough has been done to show that there is great utility in this application of electricity, and I do not overstate the probabilities in saying that in sustaining the reputation which this Society has acquired as an energetic body of investigators some member will find still new applications and accomplish new things with this agent.

Now, to proceed with cataphoric medication. Attention is called to the different kinds of remedies that may be made use of. First and foremost among all the medicines must stand that remedy which has become so helpful to dentists and physicians in the obtunding of the soft tissues,—cocaine,—a remedy without which I should want to give up the specialty which I practise. Fresh solutions of pure cocaine are indispensable. Some manufacturers do not seem to be able to eliminate the irritating qualities. You will find it a good plan to purchase your cocaine in crystals and make the solution just at the time of using.

In the use of cocaine in dentistry most of you know the way to apply it. Use a strong solution, placing in the cavity to be ex-

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[1] See Dental Cosmos, January, 1891.

cavated a pledget of cotton saturated with it, and then apply the current. Dr. Gillett recommends a twenty-per-cent. solution, or clear crystals, with just enough water added to form a solution; then apply the positive electrode, and turn on the current.

You will wonder why it is that you can increase the current from time to time without great discomfort to the patient. The reason is that the near areas of tissue become obtunded, and are consequently able to bear a stronger current than at first. Then you turn on the current and carry the obtunding agent into more distant portions. It has been objected that the time required to obtund a sensitive tooth is considerable; but Dr. Gillett assured me in conversation that he had found the time saved in excavating would overbalance the time lost in obtunding.

Morton recommends guaia-cocaine as being more rapidly diffusible under the pressure of the current. In its present form it cannot be used upon mucous surfaces on account of its escharotic effects, but this would not obtain in the dentine. The odor is most objectionable,—an objection, however, which may be overcome by combining with the oil of pine.

While on this subject a few words upon the toxic effects of cocaine may not be out of place, and also of its non-action in some cases. The toxic effect you are liable to get if you use it on mucous surfaces. During the history of its use in the Manhattan Eye and Ear Hospital in many operations it has not been uncommon to get its toxic effects. This is not serious, as a rule. With a properly-constructed rubber dam, and the use of the cocaine in the dentine alone, where it is somewhat difficult to get enough into the tissue to obtund it, it is quite impossible to get sufficient cocaine into the general circulation to produce any toxic effect.

Another thing that you must take into consideration is the fact that in some cases cocaine seems to have no effect of any kind. In your work you will sometimes meet such patients who will present this physiological condition; therefore if you occasionally meet with a case where cataphoric obtunding fails you will bear this fact in mind. When you intend to resort to cataphoric medication and use other remedies besides cocaine, it would be a wise precaution to obtund the tissue with a cataphoric application of cocaine before using the other remedies; you can carry up the current much stronger in that way than otherwise, and the stronger the current the greater the obtunding effect.

I might speak of the various properties of hydrogen peroxide, H_2O_2, which has been much used for bleaching purposes. As far

as my reading goes, there are no preparations but these—hydrogen peroxide and pyrozone—with which you can do the work known as bleaching, which is only accomplished by cataphoresis. These remedies are also useful as germicides.

In this connection attention is called to a remedy which has proved so helpful to me in nose-, throat-, and ear-diseases that I feel sure that there is a field for it in dental practice, especially those conditions attended with more or less septic developments, such as pyorrhœa alveolaris, caries, aphthous-ulcers, etc. I refer to borolyptol, manufactured by the Palisade Manufacturing Company, a *well-known, non-toxic, non-irritant destroyer of micro-organisms and spores.* The tests of two bacteriologists would indicate that its germicidal powers equal and in some instances exceed that of a 1 to 1000 solution of corrosive sublimate.

During the past few days I have made use of it, by means of cataphoresis, in three cases which may interest you. One was an Italian, about fifty years old, with badly neglected teeth, several of which were decayed, black in color, and two or three old roots were resting loosely in the gums. He had recently had a rheumatic attack, accompanied by a severe tonsillitis. The gums were retracted and boggy, and he complained of some pain around the teeth. For experimental purposes I used borolyptol cataphorically, first anæsthetizing the surface of the gums with a short cataphoric application of cocaine. The borolyptol was applied full strength to the entire surface of the gums, and wherever there were any appearances of disease. The Wheeler fractional volt-selector was employed, and this patient could stand a rapid increase of current up to twenty-five volts. The cotton pledget was frequently exchanged to allow of fresh borolyptol. The odor and soreness were much relieved. I have also experimented with two other cases furnished to me by Dr. H. W. F. Cady, of New York.

The first case was a child two years of age, who had suffered with a severe attack of measles six weeks previously. She was a badly-nourished, scrofulous-looking child, and three weeks after the measles she had a necrosis of the middle portion of the superior maxillary bone. Dr. Cady removed two teeth and a portion of necrosed alveolar process.

There was still quite a large surface of denuded bone, with tendency to sloughing of soft tissues. The odor was very bad and the adjacent teeth covered with sordes. Applied borolyptol diluted one-half, after cocaine, using the volt-selector, and carrying the voltage up to sixteen. The cotton and solution were frequently

changed, and the application was not only made to the ulcerating surface but to the entire gum surface, the whole procedure occupying fifteen minutes. Two days later the patient returned for another treatment, and the mother said the child had suffered much less pain, had been less fretful, had eaten and slept better, and that there was no odor for twenty-four hours after treatment, but it had partially returned. Amount of denuded surface about the same, but the teeth were much cleaner. The treatment was repeated, using this time full strength borolyptol. Returned two days later, with improvement, as far as condition of wound, general physical condition, and odor are concerned. Bone is still denuded.

The last case was one of aphthous sore mouth and necrosis of large sections of both superior and inferior maxillary bones, also following an attack of measles two months previously. Dr. Cady had already removed a large section of necrosed superior maxillary bone, and kindly deferred further treatment in order to allow me to experiment with borolyptol applied by cataphoresis.

There was a large aphthous ulcer on the inner surface of the lower lip, very dark and foul, necrosis of inferior maxillary bone, gums boggy and hemorrhagic, teeth covered with sordes, odor very bad. Child had high fever, and submaxillary glands swollen and very painful. Made a cataphoric application with cocaine, low voltage over entire surface for two minutes, then borolyptol diluted one-half, increasing current gradually to fourteen volts, after which the surfaces presented a much cleaner appearance. Two days later the mother says child seemed relieved after former treatment, there was less odor, slept all the afternoon, and ate more than usual; but twenty-four hours afterwards symptoms had all returned, and to-day the mouth appears about the same as at former treatment, except the ulcer is not quite so large and not so unhealthy in appearance and the teeth are cleaner. Repeated treatment, using borolyptol full strength, and increasing current to sixteen and a half volts, very thoroughly and for about twenty minutes. Three days later reports that there has been less pain in mouth, but the submaxillary glands became very painful, and Dr. Cady removed a tooth and piece of necrosed process, after which the glands were better. The ulcer was rapidly healing, and the general condition of gums much improved. I feel sure that cataphoric medication in cases similar to the ones described, using borolyptol, forms a useful adjunct to the necessary treatment by operative interference, and also hastens the separation of the dead bone.

Question.—Did you apply the borolyptol cataphorically?

Dr. Phillips.—Yes.

Dr. Gillett's first experiments and demonstrations were made with an ordinary adapter. In showing him the apparatus which I had, and which was used for the ordinary purposes of the continuous current, he said he thought that it might be used in obtunding sensitive dentine. The next day he brought a patient, the first experiment was made, and it was successful. But we found that when the current was increased the patient experienced pain, and he thought it was necessary to overcome those jumps of the current in order to make a perfect application of cataphoresis. A successful application of cataphoresis in obtunding must depend upon the relief of one pain without the introduction of another. Dr. Gillett purchased one of the same adapters. He made some changes in it from time to time, but finally found it would not answer the purpose unless the current could be so controlled that the changes in its gradations or steps would not be painful to the patient. He called to his assistance Mr. G. M. Wheeler, of the Electro-Therapeutic Company, and explained what he wanted. The result of his suggestion, in conjunction with Mr. Wheeler's mechanical and electrical skill, is the instrument known as the Wheeler fractional volt-selector. You are constantly hearing the words "rheostat," "adapter," and "cell-selector."

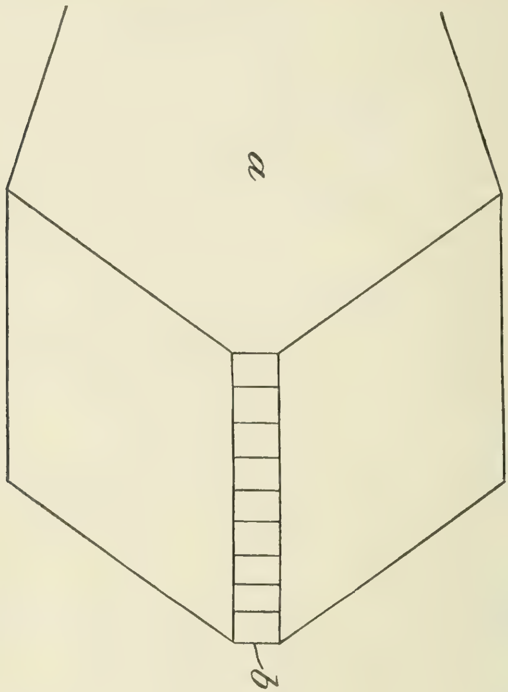
A rheostat is an adjustable resistance introduced into the circuit in simple connection with the patient to control the quantity of current flowing, without regard to steady voltage. An adapter is an elaborated rheostat, for use with the various street currents. A cell-selector is a series of contact points over which travels a sliding switch-arm, each point connecting with one or more cells of a series battery. These cells ordinarily represent about two volts of pressure each.

The difference between an adapter or rheostat and a fractional volt-selector can best be explained by means of a simple illustration like the following:

Imagine *a* to be a dam of water and *b* the sliding gate. Now, suppose you raise the sliding gate one step from the bottom and a current of water will flow; but the opening being at the bottom of the volume of water in the dam, there will be behind it the pressure of the weight of the volume of water above. Raise the gate another step, and there will be an increased flow of water with practically the same pressure.

On the other hand, if the gate should be lowered from the top one step, there would be a flow of water, but the pressure would be

diminished by the difference in weight of water at the upper and lower openings of the gate. Now, in electricity, the raising of the gate from the bottom would represent the adapter or rheostat, on



account of the entire pressure being back of it all the time. The lowering of the gate from the top represents the fractional volt-selector, because there is a gradual increase in the pressure as you lower the gate.

The fractional volt-selector differs from the adapter or rheostat as the force of water would differ if instead of raising your gate from the bottom you were to let it down from the top when you want a flow of water. If you let it down one step you have a flow of water with a low pressure. And if you let it down another step you have another flow of water with a little greater pressure, and so on. By means of the fractional volt-selector you can let on the pressure of the current by small gradations, beginning with no pressure and adding a little more pressure, and a little more, as you require. I have not seen anything that has been so effective in controlling the current as this apparatus.

There are numerous cell-selectors on the market. With them you can make use of any number of cells desired,—one volt and a half or two volts to each cell,—turning on another cell as you want an increased current. This will give jumps of pressure of one and a half to two volts, corresponding to the type of battery in use, resulting in painful shocks to the patient. These will not work well for obtunding purposes.

In the selection of sûch instruments one needs to be very careful. And for this particular kind of work, unless the instrument will permit the increase of the current in fractions of a volt, you cannot successfully use it. Dr. Gillett has told me that he has found patients to whom even half-volt steps would be very painful, and it is those delicate and sensitive patients who especially need this release from pain. Dr. Gillett says the voltage must be turned on in steps of less than half a volt. With a cell-selector you turn on one and a half or two volts at a time, and that does not answer the purpose.

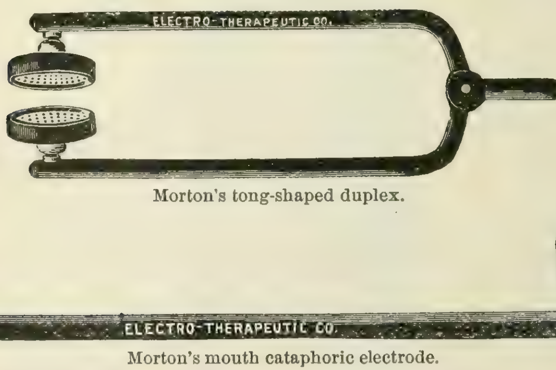
Volt-selector.

The fractional volt-selector will give you gradations of less than one-quarter of a volt, and with that perfect control of the current the possibility of giving pain to the patient is extremely remote. After careful experiments I have found that it will do the work.

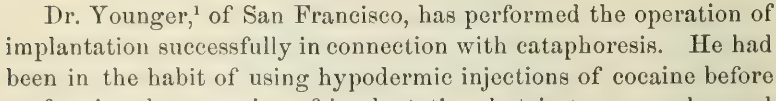
This fractional volt-selector is manufactured by the Electro-Therapeutic Company, of New York, and is made to use with the street current of one hundred and ten volts. It is so arranged that there is no danger of shock from a possible crossing of wires. For those who are not able to make use of the street current the manufacturers furnish a box of cells, which will give forty volts, and can be used in the same way as the street current.

In using the Edison current you may have a little trouble to know which is the positive pole. If you use the battery cells this trouble is obviated, the positive pole being definitely fixed and marked. To determine the positive pole, take a strip of blotting-paper, soaked with a solution of iodide of potassium, and press it down on the two poles of the circuit to be tested, and leave it for a moment, and when it is taken away one end of the paper will be dark. The dark end indicates the positive pole. It means that there is a liberation of iodine from the iodide of potassium by the action of the current.

Morton's straight applicator.



Morton's tong-shaped duplex.



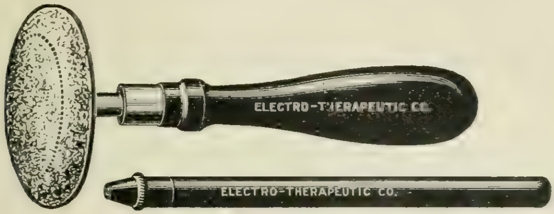
Morton's mouth cataphoric electrode.

Dr. Younger,[1] of San Francisco, has performed the operation of implantation successfully in connection with cataphoresis. He had been in the habit of using hypodermic injections of cocaine before performing the operation of implantation, but in two cases he used the cocaine cataphorically, using the fractional volt-selector in making the application, and the operation was performed with much more satisfactory results, and he told me he had no doubt that in the future this appliance would be used in such operations.

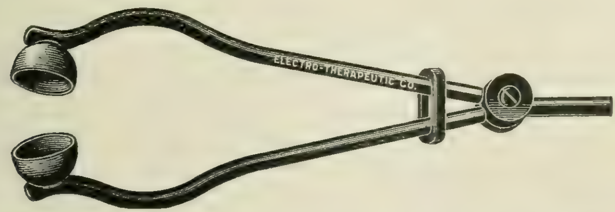
[1] Dental Cosmos, January, 1896, page 50.

In the operation of extracting teeth the obtundent will also have to be applied to the gum in order to obtund the entire area.

The following is the platinum point and handle as used by Dr. Gillett for obtunding purposes.



Here is an electrode which seems to have a certain bend to suit the dentist. This one was made upon lines suggested by Dr. William Carr, of New York.



Rubber cup electrode.

COCAINE.[1]

BY SAMUEL A. HOPKINS, M.D., BOSTON, MASS.

Ever since the discovery of anæsthesia the idea of a local anæsthetic has taken firm hold of the professional mind, and no amount of failure has been able to shake our belief that some day or other the ideal local anæsthetic will be forthcoming. It must be safe, it must be easy to administer, and it must be quick in its effect.

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[1] Read before The New York Institute of Stomatology May 5, 1896.

We need a safe local anæsthetic. There is perhaps no greater need in modern surgery and dentistry. The mental anguish, as well as the actual suffering entailed by our daily operations is appalling. It makes the profession of dentistry the most trying and exhausting one known. The pain which we are obliged to give is not only injurious to the health of the patients, but it limits our usefulness, and even affects the estimation in which our profession is held by the community at large. So much, therefore, is to be gained by the use of a local anæsthetic that the temptation is very great to try everything that may promise an alleviation of pain, and we are loath to give up anything that seems even in a moderate degree to give that alleviation, although its use may be attended by grave risks. Indeed, we sometimes deceive ourselves so great is the desire to save pain, and are almost persuaded that any risk is justifiable to gain such an end.

This, I am afraid, has been the history of the use of cocaine in the dental profession. It is a sufficient comment on its doubtful efficacy in dentistry that after so many years of experimentation it should still be necessary to publish articles in our dental journals describing its use and its limitations, and the fact that you are willing to listen to me to-night indicates that grave doubts still exist in your minds as to its unrestricted use in dentistry being justifiable.

In order to get at the facts concerning the use of this drug I have gone over very carefully a very large amount of literature on the subject, and have looked up some of the records of the cases where serious results are reported. I am indebted for valuable information to Dr. T. W. Hays, who, in March, 1894, before the Cincinnati Academy of Medicine, read a most interesting paper on the physiological action of cocaine, citing numerous authorities.

The symptoms of cocaine-poisoning differ materially in different individuals, and there is probably a disposition or diathesis existing in some individuals which renders them exceedingly susceptible to the drug. Great difference exists in regard to the time it takes for poisoning effects to appear. This may vary from thirty seconds to three hours, and the time necessary for recovery also varies greatly. Sometimes recovery is almost immediate, and, on the other hand, it may take months, and then leave the patient in a very anæmic condition. The sex, age, or condition of the patient does not seem to have any particular influence on the effect. Strong or weak, young or old, all may be quickly affected. Neither are habitual users of the drug, those who have formed the cocaine habit, entirely free from the dangers of acute poisoning.

The size of the dose and the method of its administration do not seem to control the effect. There is, however, seemingly a peculiar susceptibility when the drug is applied or injected in the vicinity of the fifth nerve or its branches. Woffler, who favors the use of cocaine, states that in most of the cases that have come under his observation where serious or fatal results have followed its use the injections were made in some part of the head. He claims that a five-per-cent. solution may be used with impunity in other parts of the body, but a solution of not greater strength than two per cent. can safely be used in the region of the head.

In a general way, the symptoms of cocaine-poisoning may be briefly described as follows: There is an excitation of the mind, and associated with it an expression of anxiety which may amount to a fear of approaching death. A feeling of warmth steals over the patient, which may be followed by a chill. The respiration becomes fearfully rapid, and later becomes labored. The pulse-beat increases to a very marked degree, and the pulse runs up to 150, or even higher. Respiration becomes more difficult, and the heart grows weak, while the mental disturbance is increased so that ideas do not follow each other in proper sequence. If the drug has been administered in the mouth, the tongue becomes numb and speech is affected; not always, however, to such a marked degree as might be expected. If the poisonous effects continue, there seems to be more general anæsthesia, and the organs so affected have a decided feeling of cold. Sometimes an irritation along the spine or back of the neck, a tickling or itching sensation, is present. The hands are closed in a convulsive manner; the fingers, legs, and arms become stiff and tetanic. The muscles of the face partake of the convulsive movements, and the expression is agonizing to the last degree. In some cases death occurs while in this tetanic condition. Sometimes, however, instead of the convulsive symptoms complete relaxation takes place. If recovery occurs, severe nervous disturbances may remain for an indefinite time.

The symptoms I have described as belonging to cocaine-poisoning are subject to wide variation. Indeed, no two cases seem to give exactly the same train of symptoms. In going over the records I have been astonished to find how many cases of poisoning are reported. Mannheim reports five cases of poisoning from the subcutaneous use of the drug, and also nine cases in which it was dropped into the eye; two where it was used in the ear; larynx, three; mouth, two; gum, two, etc. Four drops of a two-per-

cent. solution used by injection produced poisoning in an old lady, who did not recover for four days. Three drops of a three-per-cent. solution was followed in one case by marked restlessness, which disappeared in four days. 0.05 grain in one case and 0.04 grain in another injected subcutaneously into the eyelid caused intoxication lasting many hours. Dr. Hays, among other cases, mentions the fact that he himself was poisoned by cocaine injected into the gum. It is but fair to state that the dose was large, but the poisoning was almost instantaneous.

The March number of the *Centralblatt* mentions a fatal case of poisoning following an injection into the urethra. In the October, November, and December, 1890, numbers of *Therapeutische Monatsschrift* is given a complete list of the reported cases of poisoning up to that date. The percentage of fatal cases is enormous. Of one hundred and seventy-six cases recorded, ten were fatal. Enough has been said of the general poisoning effects to show that the drug is one to be used with great caution. We do not yet know what its dangers may prove, nor have we yet found a physiological antidote. Digitalis, atropine, the nitrite of amyl, and nitro-glycerin have been suggested, but the efficacy of these drugs is still a matter of doubt.

I found it a much more difficult matter to get any definite reports of serious results following the use of cocaine in dental practice. This was, of course, to be expected, as most of these cases occur in private practice, and cannot be reported without injury to the reputation of the practitioner. Consequently, we get only meagre accounts of the unsuccessful cases, or of those cases which are attended by fatal or alarming symptoms. Each successful case is, however, quickly reported, much to the glorification of the operator, and the temptation to follow in his footsteps leads to many an accident.

Appreciating this difficulty, I wrote to a number of leading New York dentists, asking for their experience in the use of the drug. I also asked, "What should be considered the maximum dose for hypodermic injection into the tissues of the mouth?" This last question has never been answered, nor can I answer it myself.

The greatest courtesy was shown me, however, and I received a large number of replies to my letter, but I will not attempt to read them, as I have promised to be brief. A large number of those who so kindly answered my letter frankly said they were unwilling to risk hypodermic injections in any strength. A few

alluded to the alkaloid, isoatropyl-cocaine, and its dangers, and all expressed the feeling that great caution should be used in administering the drug hypodermically. Dr. Delafield, under whom I had the pleasure of studying at the College of Physicians and Surgeons, wrote that he thought it should never be used hypodermically. My own experience seems to bear out this opinion, so far as it relates to injections into the tissues of the mouth.

I have myself had the scare, and although several years have now passed, it sends a cold chill down my back whenever I recall my experience. One case I shall never forget of a man in apparently perfect physical condition, for whom I had to perform an operation upon the gum between the lower first and second molars, which necessitated giving great pain. My syringe was carefully sterilized, and ten minims of a four-per-cent. solution were taken into the syringe; two minims remained after the operation, and at least two minims were absorbed by the napkins with which I surrounded the parts, so that it is safe to say that the results following were produced with a dose of not over six minims. The gum was relaxed and somewhat torn, and undoubtedly a part of the dose got into the mouth and may have been swallowed. Be that as it may, in about ten minutes there was a seeming excitation of the mind, and all the symptoms which I have previously described soon followed. I was obliged to get my patient onto a bed, and send for his physician. By the aid of stimulants—brandy and coffee—the patient gradually recovered, and was able to be driven to his home in three or four hours.

In another case, that of a young woman, the patient left the office in apparently good condition after an operation in which the drug had been used, but complained that while in the car on her way home she experienced difficulty in breathing, with palpitation of the heart, and had to exert all the power of her will to get to her house. She did not recover fully for several days. In this case not over four minims of a four-per-cent. solution were used.

A similar case to the above was that of a vigorous young man, who was a student. He likewise did not feel the effects until on his way to Cambridge; but as he had access to several convenient bar-rooms on his way out, he was able to get sufficient strength to reach his rooms. In this case not over three minims of a four-per-cent. solution were injected, and none escaped into the mouth. While the after-effects of this case were not serious, a terror of similar results was produced that made him willing to submit to

the most painful operations rather than have me make use of the drug again.

I have found hundreds of cases of cocaine-poisoning reported in various medical journals, both in this country and abroad, and shall be glad to give these references to any one who wishes to investigate this subject further.

Suggestions of new methods for doing away with the danger have appeared from time to time during the past fifteen years, and in the December number of the *Dental Digest* an article from the pen of a careful observer suggests the combination of cocaine with morphine and atropine.

Whether we have any safe or reliable substitute for cocaine in the various combinations that are suggested from time to time has not yet been determined. There is, however, a substance which deserves more than passing notice on account of the high character and scientific standing of the men who have made the investigations concerning it. Dr. A. P. Chadbourne, of Boston, in 1892, before the British Medical Association, read a valuable paper on an alkaloid which had recently been isolated by Giesel from the leaves of a small-leaved cocoa-plant of Java. The chemical constitution and properties of this substance were studied by Liebermann, who proved that it was benzoyl-pseudo-tropein. Chadbourne gave it the name of tropa cocaine, and under that name it is now sold by the leading manufacturers of drugs.

In his paper, a careful study of which I would recommend to any one who contemplates using this drug, Dr. Chadbourne relates a series of carefully-performed experiments with tropa cocaine, using cocaine of equal strength upon the control animals. I cannot, of course, give these experiments in detail, but the conclusions drawn, which were amply supported by the evidence, were as follows:

1. Tropa cocaine is less than one-half as toxic as cocaine.

2. The depressing action both on the cardiac motor ganglion and the heart muscle, especially the latter, is much greater with cocaine.

3. Local anæsthesia, both of the eye and of the skin, is much more complete with tropa cocaine, and is possibly of longer duration.

4. Solutions of tropa cocaine are moderately antiseptic, and retain their strength for at least two or three months, while cocaine solutions begin to deteriorate in as many days.

Experimentation on the human subject confirmed the above conclusions and seemed to demonstrate that tropa cocaine was

twice as strong and half as toxic as cocaine. There is, however, one possible source of error in using tropa cocaine,—viz., the possibility of obtaining an impure sample of the drug. Dr. Chadbourne, in his experiments, procured one sample that was much more toxic than the others; not more toxic than cocaine, however. But after purification by recrystallization the difference disappeared.

It is also rather expensive, and the supply of small-leaved coca-plants is naturally limited. One other difference might be considered an objection. Cocaine has a contractile action on the small blood-vessels, which tends to arrest hemorrhage; tropa cocaine has no such action.

After writing the above, I took the liberty of calling upon Dr. Chadbourne, and asked him if he had seen any reason to modify his views on the subject of the two drugs. He assured me that the experience of those who had made use of tropa cocaine only tended to confirm the conclusions he had drawn from his experiments. In the course of our conversation he gave me an important point in the treatment of cocaine-poisoning, which I have not seen referred to elsewhere. He found that with the animals experimented upon a much larger dose of cocaine could be used if the temperature of the room were lowered, and the animal recovered from the toxic effects more quickly when the body temperature was lowered by exposure to cold. This suggests that an ice-pack or exposure to the cold air in winter might give considerable relief in these unfortunate cases of cocaine-poisoning. He also confirmed the statement I have already made that an injection in any part of the head is more liable to be attended by toxic symptoms than in other parts of the body.

I do not wish to be understood as advocating the hypodermic injection of this new drug into the gum for the extraction of teeth, or other operations. I merely wish to affirm that if a local anæsthetic is to be used in this way that there is some scientific basis for experimentation with tropa cocaine, and it will probably be found much more effective and a thousand times safer than any of the nostrums that are offered to the public as substitutes for cocaine.

One other method of local anæsthesia I must refer to, as it is now before the public, supported by men of recognized skill and intelligence,—namely, the use of the electric current in connection with cocaine and guaiacol, or cocaine alone. For a more detailed account I would refer you to Dr. W. J. Morton's article in the January num-

ber of the *Dental Cosmos*, to Dr. Gillett's article in the February number of the INTERNATIONAL DENTAL JOURNAL, and to other more recent articles, which will repay careful study.

I have seen cocaine used by cataphoresis a sufficient number of times to convince me that it has a place in dental practice, and I mean to use this method for obtunding sensitive dentine in extreme cases. It is, however, too cumbersome to be used as a routine method. There is usually more or less pain, sometimes a good deal of nervous apprehension attending its use, and in some cases it fails to make any appreciable difference in the sensitiveness of the tooth. This may be due to faulty manipulation. The dam should always be in place when this method is applied, as I am not convinced that cocaine used in this way is less poisonous than when used in the ordinary manner. Two possible improvements have suggested themselves to me,—one would be to have the obtunding done by an assistant, and thus save fifteen minutes of your valuable time, for the loss of time is a serious objection to this process; and the other would be the substitution of tropa cocaine.

The suggestion has recently been made that the incisors may be rendered insensible to the touch of the instrument by placing pellets of cotton saturated with a ten-per-cent. solution of cocaine in the nostrils. I have seen this tried with entire satisfaction, but I hesitate to endorse the method from the danger of forming the cocaine habit. Doubtless, you know that snuffing cocaine up the nose is a particularly delightful form of indulging in the cocaine habit and one that is easily acquired. Singers sometimes acquire the habit by using the drug to dry up the secretions and get temporary relief while singing. Neither the morphine nor the alcohol habit compares with the cocaine habit in the undermining influence on the mind and body. For this reason I should discourage the use of cocaine by this method.

Another method of producing local anæsthesia with cocaine was suggested by Dr. Schleich, of Berlin, who recently published a monograph on the subject. Briefly, it consists of an almost infinite number of injections of an almost infinitesimal amount of the drug. The injections are made, not subcutaneously, but intracutaneously, and the technique is somewhat as follows: Beginning always in the healthy skin, and holding the syringe almost parallel with the skin, the needle is introduced, great care being taken not to push it through the skin. The fluid will distend the skin and raise a white, bloodless wheal. This area is instantly anæsthetic. Keeping within this area, you introduce the needle near its edge and produce an-

other œdematous white spot. In this way you can gradually anæsthetize a foot of territory. The anæsthesia lasts about twenty minutes, and infiltration can be repeated if necessary. In dealing with inflamed tissue it is always desirable to encroach upon it gradually from the surrounding healthy tissue. In operations requiring deep incisions the gradual process should be adopted in getting at the seat of the disease.

The strongest solution used contained only two-tenths of one per cent. of cocaine, and the weak solution contained only one-hundredth of one per cent. of cocaine, with a little salt solution added. Indeed, it is pretty evident that the anæsthesia comes more from pressure on the terminal nerve filaments than from the drug itself, since it can be shown that a two-tenths-per cent. salt solution injected in the same way will produce anæsthesia; not, however, without severe irritation. Chemists are prepared to furnish tablets made according to the formula of Schleich, and this is, perhaps, the best form in which to obtain the drug for this method of administration. How general this method will become no one can predict, but I know of the successful removal of a good-sized abdominal tumor, several operations for varicocele, the opening of a felon, and a lot of minor operations. The mouth hardly offers the best field for the practice of this method, but in a general way it is not without interest.

I cannot close this paper without a reference to the wholesale extraction of teeth by ignorant or unprincipled practitioners, who advertise the painless extraction of teeth by the use of so-called obtundents. For several years past we have been receiving from time to time in our mails advertisements of obtundents which are to be used by injection. In almost every instance the advertiser claims that no cocaine is used, and tempting offers of exclusive territory and dazzling riches to follow the use of this particular preparation are held out to the unwary. By reference to an article in the May (1893) number of the *Dental Cosmos* it will be seen that nearly all of these preparations contain a large percentage of cocaine. This article is by Dr. Edward C. Kirk, of Philadelphia, who had a number of these so-called local anæsthetics chemically examined in the Philadelphia College of Pharmacy. There were ten different preparations, all of which had been widely advertised, and in almost every case the impression had been given, if it had not been positively stated, that the preparation contained no cocaine. It was found on analysis that every one of the preparations, with the exception of Barr's, which was merely an alcoholic solution of peppermint and

cloves, contained cocaine, and many of them in such large amounts as to be dangerous even in small doses.

Unfortunately, the use of these preparations seems to be increasing. Of course, no self-respecting man could be guilty of violating the code of ethics of his profession by manufacturing and advertising such nostrums. It is well understood that the profession has a right to any discovery or improvement that may be made by one of its members, and each man in the profession is under distinct obligation to give to the profession any knowledge that he may have acquired that will benefit his fellow-practitioners.

It seems to me that it is equally a violation of the code to use and recommend any nostrums that may be put upon the market. In this particular case there is an additional reason for taking a high stand, as a disguised danger is more to be dreaded than an open one. It would be well if we could bring about such legislation as would make it a criminal offence to deceive the public by flooding the market with such nostrums, but I am not sanguine about our power to institute reforms by legislative action. We have to combat not only the inertia of political bodies, but the opposition of uneducated and unprincipled practitioners as well. Every peripatetic tooth-puller eagerly avails himself of these preparations, reckless of the danger, and while it would be a great gain to humanity to exterminate this species of dental practitioner, I can see only one way to accomplish it, and that is by a crusade of education and the creation of a higher and better public opinion.

It is the duty of every man in the profession to use his influence in warning the public against these fearful traps laid for the unwary. Every means in our power should be used to expose the charlatans who, for a fee, are willing to subject a patient to any risk, and who are doing irreparable injury by the wholesale extraction of valuable teeth. We must check this evil if we wish to uphold the dignity of our profession and preserve our self-respect. How we can handle this problem best it is difficult to know; but with high ideals and a high appreciation of our calling we can carry on an aggressive warfare that will eventually result in the extermination of nostrum manufacturers and irresponsible practitioners.

LORETIN, THE NEW ANTISEPTIC.

BY S. ELDRED GILBERT, D.D.S., PHILADELPHIA.

THE advantage of iodine preparations in antiseptic surgery have been firmly established, and that of iodoform has become the one most generally used, but with all of its good qualities there are several that are not so desirable. The disadvantages of its odor, toxic and irritant characters, greatly limit its use, and a new iodine preparation has long been desired and sought which shall be free from odor and absolutely non-poisonous. Loretin supplies this want. It has a complex constitution, being systematically called meta-iodo-ortho-oxyquinolin-ana-sulphonic acid and represented by the formula $C_9H_4IN.OH,SO_3H$. "Loretin is a bright yellow-colored crystalline powder not unlike iodoform in appearance. It is slightly soluble in water (about two parts in one thousand) and alcohol. It is practically insoluble in ether and in oils, but forms emulsions with oily liquids, and collodion, a soluble form of loretin, is also prepared. Being an acid it forms neutral salts with alkalies, which are easily soluble in water, forming solutions of an orange-red color. The calcium salt is insoluble in water, and can be easily precipitated on gauze impregnated with a solution of sodium salt by dipping into a solution of calcium chloride. Loretin gauze possesses the bright red color of this calcium salt." It may be employed as loretin powder, either alone or mixed in different proportions, with suitable materials, as calcined magnesia, French chalk, starch, etc.

Loretin colodion, in two- to ten-per-cent. emulsions.

Loretin pencils of cocoa butter, containing five to ten per cent.

Loretin ointment, five to ten per cent., with vaseline or lanolin.

Loretin solution, containing 0.1 to 0.2 per cent. of free acid or one to two per cent. or more of the soluble sodium.

Loretin gauze impregnated with precipitated calcium salt.

Its non-toxic property has been fully established by Professor Claus and Dr. Ammelburg by careful experiment, and borne out by clinical experience. Professor Schinzinger says he has employed loretin with great success in the treatment of boils, burns, lacerated wounds, poisoned cuts, and in gynæcological practice; also in many major surgical operations. In none of these was there a single instance of toxic effect.

In purulent discharges it quickly removes the offensive odor. Professor Schinzinger considers no praise too high for the anti-

eczematous powers of loretin. He says that generally, when he has been called as consulting physician and prescribed loretin, the eczema disappeared where it had resisted all other treatment and which every proposed remedy had increased. Its favorable action, he says, was distinctly developed in one case recently under treatment. "Following a slight phlegmon on the elbow, treated with carbolic acid, an extremely painful eczema spread over the whole of the forearm and up to the shoulder. After different medicaments had been tried without success and the eczema had been considerably heightened by carbolic-zinc plaster, it completely disappeared in a short time under loretin treatment." In its uses Ammelburg says that he has never been able to find albumen, blood, sugar, or iodine in the urine. The absence of the latter is especially corroborated by Professor Albrecht. Before passing to the bacteriological proofs of this disinfectant, I wish to say that for the following tables I am indebted to Dr. B. Korff.

"To each twenty cubic centimetres of disinfectant three drops of a pure bacteria cultivation was added, or of pus, and allowed to remain with occasional shaking for twenty minutes; then from each mixture four test-tubes containing sterilized broth gelatin were inoculated, to the first tube 1 c.c. of the infected disinfectant, to the second and third ½ c.c. each, and to the fourth ¼ c.c. being added. They were well mixed and then poured out on cultivation plates."

TABLE I.: *Pure Cholera Cultivation.*—Meta-cresol, two per cent.: no growth. Carbolic acid (phenol. absol.), two per cent.: no growth. Lysol, two per cent.: no growth. Loretin, two per cent.: no growth. Loretin, two per mille: no growth. Iodoform, two per cent.: upon all four plates, scattered colonies. Control, numerous colonies.

TABLE II.: *Pure Staphylococcus Pyogenes Aureus Cultivation.*—Meta-cresol, two per cent.: no growth. Carbolic acid, two per cent.: no growth. Lysol, two per cent.: no growth. Loretin, two per cent.: no growth. Loretin, two per mille: no growth. Iodoform, two per cent.: isolated colonies. Control, numerous colonies.

TABLE III.: *Anthrax, Anthrax Broth.*—Meta-cresol, two per cent.: no growth. Carbolic acid, two per cent.: no growth. Lysol, two per cent.: no growth. Loretin, two per cent.: no growth. Loretin-sodium, one per cent.: no growth. Iodoform, two per cent.: isolated colonies. Control, numerous colonies. In this series a one-per-cent. aqueous solution of loretin-sodium was tried instead of a two-per-mille aqueous solution of loretin.

TABLE IV.: *Pure Bacterium Coli Cultivation.*—Meta-cresol, two per cent.: no growth. Carbolic acid, two per cent.: no growth. Lysol, two per cent.: no growth. Loretin, two per cent.: no growth. Loretin, two per mille, on all plates: numerous colonies; about half as many as with iodoform. Iodo-

form, two per cent., on all plates: numerous colonies. **Control**, innumerable colonies.

TABLE V.: *Pure Typhus Cultivation.*—**Meta-cresol**, two per cent.: no growth. **Carbolic acid**, two per cent.: no growth. **Lysol**, two per cent.: no growth. **Loretin**, two per cent.: no growth. **Loretin-sodium**, one per cent.: no growth. **Iodoform**, two per cent.: no growth. **Control**, numerous colonies.

TABLE VI.: *Pure Streptococcus Cultivation.*—**Meta-cresol**, two per cent.: no growth. **Carbolic acid**, two per cent.: no growth. **Lysol**, two per cent.: no growth. **Loretin**, two per cent.: no growth. **Loretin-sodium**, one per cent.: no growth. **Iodoform**, two per cent.: no growth. **Control**, numerous colonies.

TABLE VII.: *Pus from a very Infectious Phlegmon* (containing streptococci and staphylococci).—**Carbolic acid**, two per cent.: retarded growth of streptococus colonies. **Loretin**, two per cent.: no growth. **Iodoform**, two per cent.: retarded growth of streptococcus colonies. **Control**, very numerous colonies of streptococcus and staphylococcus.

By the foregoing we can readily see what a valuable preparation loretin is in surgery. It is just as valuable to the dentist in his line. For nearly a year I have been using it in the treatment of pulpless teeth and teeth having abscesses in all stages with and without fistulous openings, and where I have formerly used iodoform, etc., and am now ready and fully prepared, from clinical experience, to say that loretin is superior in my hands to any of the many antiseptics I have tried. One pleasant thing to me about it is that now the persistent odor of iodoform in my office is a thing of the past, and patients are no longer asking "what that horrid smelling stuff is?" no more nausea that would sometimes happen when iodoform was used.

The action of loretin is prompt in the treatment of putrescent teeth. I have had a great deal of pleasure in its use in the treatment of putrescent pulps, having used it in several ways, but most in combination with oil of cassia, as this is a pleasant vehicle for conveying the loretin into the tooth-canal.

It may be well to give the method employed in treating these teeth. After having prepared the tooth crown the root-canals should be well opened, going as near to the apex as possible; the medicament is then pumped into the root by means of a broach wound with cotton, then a string of cotton saturated with the loretin preparation is packed in the root and the patient dismissed for a week; upon the patient's return the cotton is removed (of course no saliva is allowed to enter the tooth), and if there is no odor other than that of the medicament, another string of cotton is placed in the root same as before, but this is covered with Gilbert's tem-

porary stopping, closing it tightly; the patient is instructed to return in a week in case there is no inflammation, but should the tooth become sore to return immediately, when the temporary stopping is removed, as the tooth by this tenderness indicates that it is not yet in condition for filling; if the patient returns at the expiration of the week with no soreness in the tooth, it is ready for the temporary or trial filling, which is as follows: Form temporary stopping into cones to fill the canals; this is done by warming the stopping and rolling it between the thumb and finger; remove the dressing that is in the tooth, and with a cotton-covered broach pump in a little of the loretin mixture, following with chloro-stopping;[1] then insert the temporary stopping cones in the canals, filling the crown with white temporary stopping. This filling is generally allowed to remain for two weeks, at the end of this time we are sure that if there has been no trouble it is safe to fill permanently. In doing this the stopping in the roots is not disturbed but allowed to remain, as there is no better root-filling.

The above method is where a fistula has not been established; in case it has, the tooth is opened thoroughly, passing through the apex, the loretin mixture is pumped through the tooth until it appears on the gum through the fistula; this is followed by pumping the chloro-stopping through until it also appears on the gum. The temporary stopping cone is inserted in the roots, the tooth filled with white temporary stopping, and the patient dismissed for from three to six weeks or until the abscess has thoroughly healed, which is generally in about four weeks, unless there is carious bone or some cause other than simply the abscess. Of course, cases out of the common line are treated according to the cause. The above treatment has proved successful in many cases of long standing. Care should be used not to flood the crown of the tooth with too much loretin, as it has a tendency to darken it. I have had no trouble that has amounted to anything thus far, as I have tried to use care in this direction.

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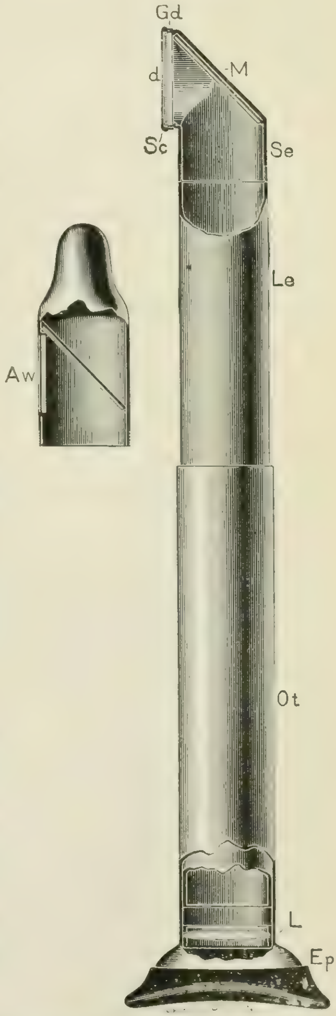
[1] Chloro-stopping is made by dissolving white temporary stopping in chloroform.

A ROENTGEN RAY CONVERTER FOR INTERNAL USE.

BY WILLIAM ROLLINS, BOSTON, MASS.

ROENTGEN'S discovery that fluorescent substances converted his rays into light rays has been of less value to dentists than to surgeons, for it would stretch even a large mouth to put a Crookes tube or an Edison fluoroscope into it. The small size of the instrument here figured is therefore an advantage.



It consists of a metal tube bent at a right angle. The short end (Se) is closed water- and light-tight by an aluminum disk three one-thousandths of an inch thick. Beneath and separated by a narrow ring is a glass disk (Gd) of the same thickness, with the surface next the aluminum coated with Edison's tungsdate of lime. In the angle is a quartz mirror (M). Over the long end of the tube slides another tube with a flaring end (Ep), having a rim of soft rubber fitting closely about the eye. In the end is a lens (L). By sliding the tube the image formed in the mirror is brought to a focus in the eye.

To use the instrument the Crookes tube is held outside the mouth with its radiant point opposite the aluminum disk, which is pressed against the mucous membrane inside. After use, to sterilize the instrument it is only necessary to remove the mirror and coated glass, when the other parts, which alone come in contact with the tissues, can be baked without injury. The short end (Se) unscrews to allow of the use of other forms. The second here figured is used in examining for stone in the bladder. To photo-

graph with the instrument the film is cut into disks with a punch and placed under the aluminum disk, with a second disk behind it to prevent the light entering the long end from reaching it. The tungsdate of lime plates were coated for me by Dr. F. H. Williams, to whom I am indebted for the use of his powerful apparatus in testing different forms of the instrument.

When the instrument is to be used as a camera alone, the films should be arranged in the following way: Place one film with its coated surface next the aluminum disk; back of this a disk of aluminum, then another film, repeating this until twelve films are in the camera. The object is to give the film varying amounts of exposure. This is a new principle in Roentgen photography, and on a larger scale when applied to other parts of the body will bring out structure that cannot be got in any other way. In working on a larger scale and with glass plates the aluminum dividing plates can sometimes be omitted, as the glass itself is somewhat opaque to the rays.

Reports of Society Meetings.

AMERICAN ACADEMY OF DENTAL SCIENCE.

The regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, Wednesday evening, February 5, 1896, at six o'clock, President Andrews in the chair.

President Andrews.—Gentlemen of the Academy: It becomes my pleasant duty to announce the programme of the evening, and I would state that we have with us as guests Edward Cowles, M.D., Superintendent McLean Insane Asylum; George H. M. Rowe, M.D., Superintendent Boston City Hospital; John L. Hildreth, M.D., Cambridge; Walter Channing, M.D., Brookline; Charles E. Woodbury, M.D., Massachusetts State Inspector of Alms and Reformatory Institutions, and Dr. Mackey, of Boston.

We have as our essayist to-night a gentleman who comes a long distance to give us, as he told me six months ago, what he himself considers one of his ablest papers, entitled "Dental and Facial Evidences of Constitutional Defect."

I have the honor to introduce to you this evening Eugene S. Talbot, M.D., D.D.S., of Chicago, Illinois.

(For Dr. Talbot's paper, see page 261.)

DISCUSSION.

President Andrews.—We have with us to-night gentlemen who are able to do this subject full justice, and it is with a great deal of pleasure that I call upon Dr. Edward Cowles to open the discussion.

Dr. Cowles.—I am very glad to have had the privilege of hearing Dr. Talbot's instructive and very interesting paper, and I regret very much that I am unable to contribute anything to the precise and scientific study which he has made of this subject. Those of us who as alienists are engaged in dealing with disordered mental manifestations do not often go into these matters in this way, although what I have heard to-night adds to my previous understanding of the matter of physical degeneration. And the statistics which have been given indicate its great importance to us in our study of mental diseases. I think the alienist who has made any extended study of mental diseases soon comes to recognize the fact that he may divide all his patients into two general classes. Very many of his patients who are insane may be said to be of the normal class. They are people of good heredity, who, under stress or wear of life, break down and become subjects of mental disorder, the result of physical and nervous exhaustion. We see this in cases of melancholia, and many other cases from which we expect a large proportion of recoveries. The other class, which we are latterly calling the "degenerates," are of that type of persons who have exhibited all their lives a certain degree of "nervous instability," as we say. These people are born with invalid brains; their nervous systems indicate an inheritance of weakness and conditions that are asthenic. Then there are some people who acquire that condition before coming to adult life, and in such cases the results which follow are about the same as in the cases of those who inherit it. The peculiar differences of the manifestations or symptoms in these cases are very striking, and it is of great interest to those of us who have studied these things to notice the peculiar variations from what might be called the regular forms of insanity that appear in these degenerates, or persons who tend to degeneracy in a greater or less degree. Now, if one can set up a comprehensive theory of this whole subject, which is very strongly suggested by Dr. Talbot's paper, it would certainly be very interesting, and I am inclined to think that there is a good deal in it.

In the cases of mental disorder which I first described among

normal people, where we expect recovery after a due course of restorative treatment, securing the return of health by promoting nutrition and removing causes of strain, we are turning latterly, I think, to the theory of nutritional disorders and the means of repair; we are not looking so much for the causative influences as we must in those cases of heredity. We may regard such persons as being sound individuals, well endowed, but breaking down, as I said before, because of overwork, overstrain, they acquire conditions of fatigue and exhaustion, which means precisely disorders of the nutritional processes. These being corrected, the patient may recover; and such cases always present hopeful prognosis.

Turning to the other class, we see that the reason why they may yield sooner to influences which tend to unbalance the nervous and mental functions is that they are endowed with less than normal resistance to strain and stress. This is the same theory which we hold in relation to the physical side of life, the physiological or chemical theory,—that is, that impairment of function is due to disorders or derangements of the physiological or chemical processes of nutrition. These people are more susceptible and quicker yield to the influences that overbalance nervous energy.

It seems to me that Dr. Talbot has given a very distinct corroboration of the views I have had upon this subject, noting so plainly as he has the effects of trophic nutritional changes in their manifestations upon the conditions of the teeth and the bony structure of the organism. But when we come to study the more profound changes in the bony structure, such as he first noted, and attempt to assign a cause for the conditions that arise in the process of development that are due to congenital influences, I think we must have there a very rich field for study in finding conditions correlative with the mental changes, the observations of which make up the professional work of the alienist. I wish to thank him again for the very instructive paper, and to thank you, gentlemen, for your attention.

President Andrews.—There are many here present who will remember a delightful evening we had about two years ago, when a paper was read by Dr. Channing in a similar vein to the one we have heard to-night. I am sure we can consider ourselves very fortunate to have him with us again this evening to say a word on a subject in which we are mutually interested.

Dr. Channing.—It is a melancholy fact for us to believe, as stated by Dr. Talbot, that from fifty to seventy-five per cent. of your patients are degenerates. I think that is putting the per-

centage rather large. I remember at the Guiteau trial one quite brilliant expert alienist, who gave valuable testimony, made the statement that about one person in five was insane. When Judge Porter, the government counsel, got up to examine him, he looked quietly at the jury and said, "The witness has stated, gentlemen, that one person in every five is insane. There are twelve of you, and, according to his statement, two of your number must be insane." So it is easy enough to make these general percentages, but I feel that we have not yet got to a point where we can give the percentage of degenerates. In the first place, I think that word is used altogether loosely. I don't think we have any proper standard by which we can judge what a degenerate is. Among the authorities, it is understood that a person must present a certain number of stigmata to be classed as a degenerate, and that is the rule followed by Lombroso, whose investigations are of great interest, though he has based his statistics on a comparatively small number of persons. He has made a great number of measurements, and it is on the basis of these measurements, principally, that the statistics are founded from which his conclusions are derived, and we are now told that persons with certain sets of peculiarities are necessarily criminals or mentally defective. I must agree with David Nicholson, the superintendent of the Broadmoor Criminal Lunatic Asylum, in England, who takes issue not directly with Lombroso, but with the criminalists,—with the men who believe they can get at this thing from the anthropological point of view,—and thinks that they have failed to prove their case. On the same basis, Dr. Nicholson says we might establish a "doctorology," or a "parsonology," but how would it do to take a comparatively small number of clergymen and measure them very carefully, and, if they presented certain peculiarities, how would it do to conclude that all persons who presented about the same measurements and peculiarities must necessarily be clergymen? Suppose we should take a certain number of farmers and on investigation we find that they possess in common certain moral obliquities, and coincident with that we find that they present certain asymmetrical proportions, it would not follow that you could take all the farmers and classify them and make your deductions from these statistics. I do not believe that a few asymmetries necessarily prove that we have degenerates, and also do not believe that most of the asymmetries, upon which we are asked to believe certain statements, are as accurately determined as they should be. In the first place, every individual should not only be observed, but

he should be carefully measured. Furthermore, we must not base our decision on the *bad points*, as Nicholson says, that we find in a man; we must also estimate the good points in him. If you are to decide that a man has certain mental or moral defects because by your measuring instruments he presents certain asymmetries, you naturally decide that it is a defect of evolution and there is nothing to be done for him, and yet the good qualities in that individual may perhaps, as a matter of fact, completely overshadow the defects. Therefore, I say that that is only part of the story. We have not yet arrived at the point where we know actually what a degenerate is; we have not had enough careful investigations to arrive at anything definite for a standard.

When I was with you before I referred to the measurements which I had taken of seven hundred of the insane. When I made these observations, several years ago, we did not estimate as carefully as we do now some of the physical stigmata. The measurements I took were of the head and outlines of the head, and therefore I should qualify a statement I made at that time in regard to no uncommon peculiarities presenting themselves as a rule in the upper class insane. I cannot say, as far as the palate was concerned, that I was struck by any peculiar difference showing itself between their mouths and the mouth of the average individual.

Going a step further, we cannot classify in a sweeping way as degenerate persons who present even mental defects, because, as Dr. Cowles has told you, some of those who have acquired mental disease may present peculiarities similar to those of the congenital class, but it is using a very strong word to call them "degenerates." They are individuals who present phases of evolution, disorganization, and thus include all various forms of mental weakness and defect and peculiarity and originality.

As to idiots: Idiots certainly should present very marked degenerate physical features, and they naturally do, because they are the lowest stage of degenerates. They represent varying degrees of arrest of development, and you cannot help in such cases finding stigmata of various kinds and sorts; but I am certain that even in idiots we overstate this question of physical degeneration. I cannot speak as positively as you can about the teeth, not having had such extensive opportunities for observation, and perhaps a more critical observer could notice defects that I would not. I hope Dr. Talbot will come and see my casts, and perhaps he can elucidate something from them. I have always held that the only proper way to get the asymmetry of the palate is to take a cast of it. Of

course the reproduction is not perfect, but there you have something on which you can study, and I think it sufficiently accurate for our purpose. This plan was not followed by Dr. Clouston in his study of the mouths of six hundred persons from which he has made up the percentages which he has presented to us. The persons examined included criminals, insane, idiots, boys in a school, epileptics, etc., and to show you how these examinations were made, he states that over two hundred convicts in a prison were examined in two mornings. Well, upon such a basis as that, it seems to me his observations are of somewhat questionable value. He divided up his palates into three classes,—*typical*, *neurotic*, and *deformed*,—and he got of the typical kind eleven per cent.; neurotic, twenty-eight per cent.; deformed, sixty-one per cent. This tremendous percentage of sixty-one per cent. was arrived at in the way that I have detailed. I have one thousand good casts of the palates of idiots, and I will give you the percentages that I got from a careful study of these casts. I did not feel that I really knew what a typical mouth was, so I did not use that term, but put them under the classification of "average," and I found that fifty-two per cent. of them were average, 37.2 per cent. were neurotic, and 10.8 per cent. were deformed. Mr. Edward Atkinson, who, we all know, is a man fond of statistics, has made a revision of the old phrase, "figures lie," and puts it a little differently; he says, "liars figure." It is very evident that the figures have lied in either one case or the other; but I feel secure in my position, because I have the casts to back me. I cannot agree with Dr. Clouston in these statistics, though he is one of the best authorities on mental diseases that we have.

In speaking of the condition of the teeth that Dr. Talbot finds among the insane, I do not think in my experience I have found that the teeth of the insane are in very much worse condition than might possibly be expected from the care which their teeth naturally receive. You must remember that these people take no care of their teeth, and taking into consideration also the kind of food that they have in the public hospitals, what can you expect under such conditions? Idiots also neglect their teeth; but, in spite of all this, I have been surprised to find how good they were. To refer again to the statistics I had of these thousand casts of idiots I have put down 93.2 per cent. of their teeth as being average (that refers to the size), 1.2 per cent. large, 5.6 per cent. small, 70.5 per cent. regular, 29.5 per cent. irregular, forty-five per cent. decayed, and in eleven per cent. dentition was delayed.

There is just one point more on which I will speak in regard to the insane. If we can rely upon the English statistics of lunacy, the increase is not very rapid,—that is, the asylums have ceased to fill up as they did in former years. Of course, the asylums are always full; but, taking all the cases which are registered in England, it is stated that the number of cases of mental disease is not increasing very rapidly, and those who enter the insane hospitals are more often than formerly from the class Dr. Cowles and I have both spoken of,—of the constitutional alienations of the degenerate class. We get fewer of the acute cases of acute mania and more of these cases, which, as I said before, are the result of constitutional defects.

President Andrews.—The Academy had invited to be present here to-night and take part in the discussion, Dr. Fernald, of the Home of the Feeble-Minded, and up to ten or fifteen minutes before our dinner he was expected to be here, but at that time I received a note from him, stating that he was unable to be present, which he regretted very much, as he wished to be here and meet Dr. Talbot. Fortunately, we have with us a gentleman who has given this subject a good deal of attention, and it is with great pleasure that I introduce to you Dr. Chas. E. Woodbury.

Dr. Woodbury.—I think your President has a little overstated the matter when he says that I have given much attention to this thing, because, unfortunately for me, I have not. Of course, a person being connected with institutions mostly caring for the insane for twenty years could not help noticing some of these points, but I wish to thank Dr. Talbot for the information I have received from his paper. In my position as State inspector of institutions for the State Board of Lunacy and Charity, a large number, practically all the insane of the State, pass under my eye, and on this account I wish that I might add something to this discussion, but I certainly must express to you my pleasure at being here, and great gratification at hearing this very interesting paper. It will serve as a stimulus to me, as I go about in the different asylums, to observe these appearances which he has so carefully noted in his paper.

I may say to you that we have about seven thousand—a little less—in our insane asylums and in the almshouses in this State, which is quite a small percentage, the population being about two million five hundred thousand. Of this number a little over five thousand are in the State institutions proper. We have some seven or eight hundred in the town and city almshouses; that

includes part of what we might not properly call insane, but feeble-minded, and, as I said, going through this large army of degenerates,—if we can call them so, although I have never regarded them as such, as has been stated before here this evening,—I have had many opportunities of noting physical defects, yet the paper of Dr. Talbot will help me very much in the study of these unfortunate beings that are confided to our care.

Dr. Brackett.—It seems to me that there is a great deal that might be said in this connection, yet I hesitate to begin to speak, fearing I may say too much, and knowing that others here are much more capable of discussing the subject than myself. The paper presents so many phases that the possibilities for discussion seem to be almost endless.

I think dentists in recent years, more than formerly, have come to regard many of the local lesions that come specially within our province as being dependent upon systemic conditions rather than local causes. In multitudes of ways we appreciate that fact. The connection between gouty diathesis and erosions and abrasions of the teeth, between rheumatic affections and diseases of the kidneys and deposits of tartar in the mouth and other relations are becoming more and more noted, so that we now look for poor nutrition, poor innervation, and all of that in connection with the affections which we especially treat. For instance, there came under my observation a young lady whose teeth were all in a good condition of repair at a particular date, but she had a severe illness, the exciting cause of which was prolonged sea-bathing,—remaining in the water until she was chilled, followed by an illness of more than a year, and the development in eighteen months of thirty-six new cavities. In multitudes of ways, too numerous even to think of making allusion to in the short time we have for discussion, we see the connection between systemic condition and local expression. I have a patient whose mouth I first examined some twenty-two years ago, and she has remained continuously in my charge ever since. When I first saw her teeth I thought that they were likely to need very little repair during the rest of her life, but she began to have a series of troubles, family bereavements, a changed home, anxiety over money matters, general worry, and all that sort of thing, and for a score of years her teeth have needed a great deal of attention. There have been successive deaths of pulps and consequent treatment, and I do not think that for several years past there have been three successive months during which she has not been in my chair. During a part of this time

her nervous condition was such that there were quite marked indications of locomotor ataxia and various other neurotic expressions. I mention this as one of the multitudes of instances where I have noted this coincidence of tooth-failure and nervous troubles. I think we are appreciating more than ever before how innervation and nutrition are the foundations upon which rest the mental and physical well-being of the individual, and that the lack of general well-being is one of the many circumstances which affect the character of the teeth.

With reference to hereditary influences and tendency to degeneration, numerous instances passed through my mind as I was listening to the paper, especially in cases of multiple birth, which seemed in a way to corroborate, at least partially, some of the doctrines. In one family in which in different members there have been expressions of epilepsy, tuberculosis, and rachitis, I have found several instances of what has been denominated spontaneous death of the pulps. In the case of one daughter there has been not less than three sound upper molars with dead pulps.

I am a great believer in the doctrine of maternal impression,—of the influence of the mother's system and mother's mental condition during pregnancy upon the well-being of the child. I have an instance in mind which I think is a good illustration, and the facts are quite within the knowledge of the gentleman on my left. There were three daughters in the family. The older daughter, it is right to say, was of feeble mind; the second possessed good general intelligence and capacity, and was free from any marked neurosis. She was born, as I have heard her mother say, under more favorable conditions, the mind of the mother having been in a more tranquil state and the general health good. During the months previous to the birth of the third daughter the mother was in a condition of great anxiety and worry, even fear, on account of a number of circumstances by which she was surrounded. The difference between the second and third daughter was very noticeable, the youngest being noted for her extreme timidity, which was apparent in her walk and in her manner of speaking. She was extremely nervous, any little noise coming unexpectedly would give her a start, and she would faint away on very slight provocation. Soon after she passed out of her teens she became an inmate of the State Insane Asylum, and shortly afterwards died. I think if we try to bring to our minds circumstances within our knowledge of people whom we have known, we shall find ample evidence to corroborate the doctrines of the paper with reference to the inevitableness of the ex-

pression of hereditary traits of various kinds, whether it be the murderous disposition or kleptomania, dipsomania, prostitution, or any of these abnormally-debased expressions of humanity. I noted in a newspaper, while I was on the train coming here to-night, an editorial commenting on an article in a recent number of the *Cosmopolitan Magazine* by Margaret Deland. The story or sketch runs something like this:

A certain woman devoted herself to the work of reclaiming a particular prostitute. She gave the matter earnest attention, protecting, encouraging, and shielding the woman in every way for a long period, and while under this protection the reformation seemed to be sincere; but, just as soon as that was withdrawn, the prostitute recurred to her former ways and soon came to the end of her life. The suggestion of the sketch is that such persons are mental degenerates, and the newspaper in its criticism states that work for their reclamation is effort not well directed. Certainly there comes out of this the moderate deductions that those people who in their mental make up exhibit no marked prominence of any kind of insanity ought to be particularly thankful; that many of our mental and moral degenerates act from impulses that are entirely beyond their control and for which they cannot be held responsible; and that the only help we can give them is to be charitable with them and deal with them considerately, as I believe is done by those who are in charge of the almshouses, the insane asylums, and the reformatory institutions generally of our New England States.

Dr. J. L. Williams.—I can only express my gratification at the systematic thoroughness, and patient, persistent investigation shown in Dr. Talbot's paper. It clearly presents the fact that a "truism is defective in not recognizing any but an immediate cause."

The *immediate* cause, whether chemical or bacterial, does not *fully* explain dental caries in constitutional diseases, or in overstrain of vital powers from various causes, the bony system, as he says, being most completely under the control of the nervous system. As Dr. S. B. Palmer has said, "There are deeper causes than chemical or bacterial ones." This subject of vitality is the root of the science of biology, of which our specialty, with general medicine, is but a branch, and the more we know of the root the better and sounder knowledge we shall have of the branches.

My own general observations of the connection of morbid states of the teeth and mouth, with conditions of nervous overstrain from

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To understand pathology, we have to begin first with the study of physiology in order to be able to distinguish between health and disease. We must know, first, what is the normal condition, the normal action, before we can declare what is abnormal or imperfect. It strikes me that the plan followed by Dr. Talbot in making up his statistics, either by observation or measurements, fails a little in not showing us what we should expect in a normal individual. We meet with many cases of persons in first class physical and mental health who do not present normal mouths. Suppose we should go over to Harvard College and make examinations of the mouths of the three thousand students there. We should expect to find there a high average of both mental and physical development, but how much will the percentages differ from the insane or others? I imagine very little; I think you will find about the same variation. There is no such thing as a typical mouth, because there are wide variations within normal limits, and we are not able to decide what are the extremes.

I would like to ask the essayist whether, in making up his statistics, he has completely analyzed them so as to understand whether the patient under examination should be classed under the head of acquired degeneracy or constitutional degeneracy. For instance, if a deaf and dumb person is under examination, has he discriminated between the two classes, the congenital and the acquired, and, if a case of mental disease, has he recognized the two classes that Dr. Cowles so clearly and forcibly defined here to-night?

President Andrews.—A word in regard to the formation of the tooth. The full size and width of the point is formed in embryonic connective tissue. This is covered by its enamel organ. These tissues calcify and growth goes on normally until scarlet fever, measles, or some other disease occurs. During this illness there is an arrest of growth, the tissue forms faulty or shrunken. When health returns the growth goes on normally again, and the tooth is bound to attain to its full size, as Dr. Talbot says.

If there is nothing more to be said, Dr. Talbot has the floor to finish the debate if he so desires.

Dr. Talbot.—I have a very little to say in rebuttal of the remarks that have been made this evening. Dr. Channing has taken the opposite side of my paper to a certain extent, and makes the point that he is very sorry if it be true that so many of our patients are degenerate. I regret that he was obliged to leave us to catch his car.

Dr. Channing is looking into the future; we cannot go beyond what the present offers in regard to the study of degeneracy. We must take the accepted views that are held by alienists and neurologists at the present day. In France, Austria, and Italy, where most of this work has been done, the subject has been earnestly studied for the past fifteen or twenty years, and naturally more advance has been made in other countries; they claim that one deformity means nothing; that an individual must present at least three or four deformities of different organs of the body or parts of the face. That is the rule we must follow in our investigations to-day, and what the rule may be twenty-five or fifty years in the future. I agree with Dr. Channing that the term degenerate is rather indefinite, but we must take the rule as laid down at the present day by those who have given so much more time and study. If you will study your patients as I have, you will come to the same conclusion. I am not speaking at random; I am speaking from facts.

Dr. Channing also criticised the statistics given by Dr. Clouston with regard to the deformities of the mouths of idiots. It might be well to state that Dr. Clouston is one of the ablest investigators in the world; I think he will rank as one of the best men who has ever written on the subject of mental diseases. He has written a number of works, but his work upon "The Neuroses of Development" is one of the best that I have read touching upon this subject of the palate. I am sorry to say, however, that he is not as well posted as we dentists in regard to the jaws, and in making up his statistics he puts down under separate headings in his classification the neurotic jaw and the degenerate jaw. Now, if you ask a neurologist to tell you the difference between a neurotic individual and a degenerate, he will say to you that a neurotic is unstable through the influence of a weakened nervous system, and that a degenerate is a little more unstable; at best it is a question only of degree. Therefore Dr. Clouston makes the fatal error in his classification by classifying the same condition, as we understand it, under the separate heads of neurotics and degenerates.

Dr. Channing also speaks of the difference in the sizes of the teeth; that he has found the size of the teeth of the degenerate to be equal to that of the average healthy individual. We do not expect to find any difference in the sizes of the teeth. If the teeth do not vary in size to-day more than they did three thousand years ago, why do they not? It is very easy to understand. In

our histological studies we learned that the teeth attain to their typal limit by the sixth week, and if they do vary in size that change must take place before six weeks. After a tooth has attained its size and form no condition of the body can change that size, because it has got its growth before that period. The foundation for the development of the teeth is completed by the eighth or ninth month, and as long as the patient lives no change can take place; therefore the child does not inherit nor do trophic changes in after life affect the structure of the teeth to the extent of producing a degenerate tendency in either the form or the size; consequently in degenerates we would not expect to find a great difference in condition of the teeth.

In the course of Dr. Fillebrown's remarks he asked if I made any distinction between the acquired degeneracy and the constitutional. Certainly I do. I will confess that in my first work I did not make this distinction, because the subject was entirely new to me, and I hardly knew what facts had to be considered, but I distinctly understood the difference between inherited conditions and those of trophic changes, and my statistics are made up accordingly.

I agree with Dr. Brackett in regard to the influence of heredity in its bearing on this subject.

Dr. Clapp.—I wish to offer a motion for a vote of thanks to Dr. Talbot for giving us this very able paper. All of us are busy trying to stop the ravages of decay, and when any man can come before us as busy as we are, but who has more force perhaps, and who has spent so much time as Dr. Talbot has investigating and tabulating such matter as he has brought before us to-night, the least we can do is to express our appreciation of it, so I have great pleasure in offering this motion for a vote of thanks.

Unanimously carried.

William H. Potter, D.M.D.,
Editor American Academy Dental Science.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A MEETING of the Institute was held on Tuesday evening, May 5, at the residence of Dr. Benjamin Lord, 34 West Twenty-eighth Street, the president, Dr. Lord, in the chair. The minutes of the last meeting were read and approved.

The president introduced Dr. Dawbarn, who brought with him for exhibition before the Institute two patients. One was a young girl with a non malignant type of epulis springing from the socket of the upper right first molar. It had been first noticed nearly two years before, and had not grown much since then. It was at this time not larger than a pea. Of late it had seemed to be the starting-point of attacks of facial neuralgia upon that side.

The other patient was a young woman who developed the sarcomatous type of epulis—as proved by microscopical examination—springing from the sockets of both bicuspids upon her upper right side, and being of nearly a year's duration when Dr. Dawbarn first saw her. He operated by removing all the teeth on that side save the central incisor, and then chiselling away the entire alveolar process for a corresponding distance. Healing was prompt and complete, but after two months there was some recurrence at two points. For this reason Dr. Dawbarn entirely excised both of her external carotid arteries, making two operations for the two sides, as it is a long dissection. The object was to starve out the growth by shutting off its main blood-supply. This succeeded, as both places of recurrence gradually disappeared, leaving sound healing again. Whether there may ultimately be again a return only time can show. She will be watched closely, and in that case the entire right upper jaw must be excised. Because the resulting deformity from this would ruin any chance of marriage, Dr. Dawbarn thought the attempt to save the jaw justifiable.

The president thanked Dr. Dawbarn for so kindly exhibiting the patients, and commended him for his skilful treatment of them, and then called upon Dr. W. St. George Elliott, the chairman of the Committee upon Recent Dental Literature for the report of the committee, which was read by Dr. Elliott.

REPORT ON RECENT DENTAL LITERATURE.

Your committee beg to report that they have given the matter of a report on recent dental literature a good deal of thought, and while believing that such report might be made of importance, yet there are many difficulties in the way. Your committee, like most

committees, cannot get together often, and were they to do so, could not work harmoniously, the difficulty being that no two members can have the same views as to the importance or non-importance of certain articles. In this first report we beg to offer some suggestions. First, that only those be appointed on this committee who are willing to bestow the necessary time and labor; second, that we report but once a year.

We think there is no subject now before the profession so important and so interesting as that of cataphoresis, and there are several articles in the journals worthy of study. We know that cataphoresis is but the forcing into the system of various medicines, through the agency of the electric current, for various purposes; that a pressure of a maximum of, say, twenty volts is necessary with a current of less than an ampère; that an essential feature is that the pressure must be turned on, increased, and decreased gradually, or pain will result. With these essentials before us, we can more clearly look into the various statements made. Our friend Dr. Morton contributes to the January *Dental Cosmos* a paper on the subject, and brings forward the combination of guaiacol with cocaine, the former containing eight per cent. of the latter; the combination of these two sedatives are supposed to act much more promptly than when given alone. This idea does not seem to be sustained by any experiments or proofs. Drs. Morton and Gillett both bring forward the Wheeler volt-selector, an apparatus for turning on the current slowly; it is misnamed a volt-selector, and is merely a suitable reostat. There are several ways of obtaining the current. First, the street current, of one hundred and fifteen volts, passed through a suitable resistance, as the Wheeler volt-selector, to the patient; second, the use of a primary battery with resistance; and, third, the combination, or, more properly, the street current passed through a storage battery. By the means just alluded to—the street current passed through resistance, and thus to the patient—we meet with the serious objection that the street voltage varies as high as ten per cent. in pressure, and one per cent. sudden increase or decrease of pressure produces pain. In the second process, a primary battery is used, with resistance. This plan has much to commend it, for the apparatus is portable and efficient, the only objection being the cost. A good dry-cell battery, with milliampère meter and switch, costs some fifty dollars, and, with full use, will not last over a year, when all the cells must be replaced. In the third process, the storage cells (ten), of two volts each, and costing five dollars and fifty cents each, are kept saturated by con-

nection with the street current, while switches, milliampère meter, and perhaps voltmeter, with resistance, form the necessary apparatus.

Drs. Morton and Gillett use the first form of current,—street, Wheeler volt-selector, etc.,—while Drs. J. Morgan Howe, Van Woert, and others the primary battery. Dr. Brown, of Montreal, uses the street current through storage cells, and Dr. Rollins uses thirty-volt candle lamps as resistance, together with a rotary resistance, probably the familiar German-silver wire resistance-box, taking his current from the street. There is sufficient evidence now before the profession to prove that there is something of value to us as dentists in cataphoresis, but it is not an unmixed blessing, and does not prove of value in every case. The present objection to the apparatus is the time required, averaging, say, fifteen minutes. But experimental efforts should reduce this. One minute is long enough; indeed, we see no reason why it may not be made so rapid that we can carry the cocaine into the dentine by the use of our excavators while in the act of excavating. The objection at present to this, in addition to the time, is the pain from making and breaking circuit when the instrument is applied and removed. This might be obviated by using a large current with low voltage; say, ten ampères and one volt.

In the January *Dental Cosmos* there is an interesting article by Dr. W. E. Walker, of Mississippi, calling attention to an unnoticed anatomical fact,—*i.e.*, the downward slope of the roof of the glenoid fossa. It is for this reason, the doctor states, that a set of artificial teeth articulate perfectly in the articulator, but failed to do so when placed in the mouth. Natural lateral motion in the lower jaw must be accompanied by a downward one as well. Dr. Walker states that this angle varies in different individuals from twenty-two to forty-five degrees, and in his own articulator the angle is made adjustable.

Dr. Black, of Illinois, has an excellent article on the influence of oxidation in alloys to produce contraction. His experiments prove his statement, but the older members of our profession remember when we were all told to work away the oxide with alcohol, and how, years afterwards, we were told not to work them. Here we have a text upon which we might expatiate all night. There has been a tendency in the profession, unfortunately, to follow any one who makes a statement, without regard to proofs. Thanks to Dr. Miller, Dr. Black, and others, we are now more incredulous, and want at least some evidence to support assertions.

In the *Journal of the British Dental Association*, Rutherford, of London, advertises a new crown, all porcelain, the only novelty being that the hole in the crown is oval, and a flattened pin, cemented in, is used.

Dr. Strang, of Bridgeport, Conn., recommends the combination of oxyphosphate and amalgam. First alloy is mixed with mercury. Then phosphate powder added, and finally liquid phosphoric acid.

In an editorial in the *Items* there is a good deal said of injury to the teeth by the tooth-brush, and this statement is made: "It is a shame to see the destruction of so many sets of nice teeth from this cause." Perhaps Dr. Welch's opportunities for investigation may have been remarkably good; at all events, the chairman of this committee, in his twenty-six years of dental practice, has yet to see the first set of teeth ruined in this way, while an innumerable number have been vastly injured by the lack of thorough cleansing. Your committee beg to state their belief that it is not possible to produce a true case of erosion by the tooth-brush. With the great majority of these cases there is a sharp edge, and it is impossible for this edge to be produced with the brush; on the contrary, brushing the teeth would soon destroy the sharp edge. Patients should always be instructed to brush from the gums, as being more efficacious than across the teeth.

Dr. Sudduth, of Minneapolis, has a good article in the February *Dental Cosmos* on pyorrhœa, mechanical removal of irritants, pyrozone thirty per cent. and cocaine in pockets, and in extreme cases zinc chloride, with other medicaments.

Dr. Driscoll, of Manatee, Fla., describes his mode of using oxyphosphate and amalgam. First introduce the mixed phosphate into the cavity, and, before setting, press into the cement a button of alloy. There are some objections to this plan, unless great care is used to prevent the cement getting to the edges.

Dr. A. H. Brockway spoke favorably of the report as read by Dr. Elliott, and said it had always been a favorite idea of his that the interests of a dental society could be furthered by occasional reference to and discussion of papers already published in the journals. For that reason he expected good to result to the society from the work being done by Dr. Elliott's committee.

The Committee on Operative Dentistry, Dr. E. A. Bogue, chairman, stated that the report of that committee would not be read for lack of time, but would be presented at a later meeting still further amplified. An extract from Dr. McNaughton's portion of the report was read, because it gave the formula for his obtundent. This

obtundent is composed of equal parts cocaine and thymol made by heating the thymol in a test-tube until it is melted and dissolving the cocaine in it. For sensitive dentine a piece of asbestos paper is saturated with this and placed in the cavity over as broad a surface as possible, and this is covered with zinc phosphate for several days.

The remainder of the report was stated to consist of experiments with the new volt-selector, so extensively advertised at the present moment as serving to obtund the sensibility of teeth by cataphoresis.

The committee found that from fifteen to forty minutes were required to secure immunity from pain with this particular instrument, and that the process was very disagreeable and not free from dangers of various kinds, not the least of which was the danger of so thoroughly displeasing the patient as to permanently offend him. The results of a few experiments on bleaching teeth are promised for a later date.

The President.—There is now an opportunity for any who wish to speak upon this subject of cataphoresis. We would be glad to hear from Dr. Allan, of Newburgh.

Dr. C. F. Allan.—I would like to say that the experience of Dr. Bogue in the use of cataphoresis has not been mine in the one extreme case in which I have tried it. Some weeks ago, Dr. Van Woert was kind enough to bring his apparatus to Newburgh, and I had a patient on hand, a young lad of thirteen or fourteen years, and for whom I had found it difficult to work, who was suffering from a deep crown cavity in an upper second molar, and in whose mouth our ordinary remedies for obtunding pain were quite useless. The boy wanted to do his part, tried hard always to bear the necessary pain, and simply found it impossible. He was evidently anxious and fearful of this new method, and the use of electricity had to him the meaning of something strange and fearful.

One had to be very gradual in the turning on of the current, and it was thought best to keep it on an unusually long time, three-quarters of an hour, but at the end of that time there was no more pain than if I had been working on a block of wood, and the boy was delighted. I could use the bur with the utmost freedom, and the turning up of the leathery decay and the completion of the filling was without any apparent resuscitation of feeling.

I have seen the patient several times since, and there have been no unpleasant after-effects, such as spoken of by Dr. Bogue. A twenty-five-per-cent. solution of cocaine was used.

I would say that with the lack of fear, the result of his practical experience of this method of treatment, this same patient would require probably not half the time in a future case to accomplish the same result.

Dr. G. S. Allan.—The Executive Committee has received a communication from Dr. Jack, of Philadelphia, upon this subject, which, with the president's permission, I will ask the secretary to read.

Dr. Louis Jack.—As Dr. Allan will inform you, I have been using acceptably the apparatus No. 11 of the Chloride of Silver Dry-Cell Battery Company, of Baltimore. This was chosen because it has been efficient for medical purposes, and further, that it had attached to it the Willms controller, which gives the most gradual gradation of the resistance. This commences with a resistance of ninety thousand ohms, which is reduced by one hundred and twelve contacts, and therefore these furnish a very slow gradation.

The well-known fact that the chloride of silver cell is extremely constant, and that it has a ratio of voltage to ampèrage which is acceptable to the human tissues, were further reasons to lead me to adopt this source of current.

The voltage of each cell is one and the ampèrage between one-fifth and one-fourth of one ampère.

I have used eighteen- and twenty-four-per-cent. solution of cocaine hydrochloride and of the citrate, the latter appearing the most efficient. The citrate at present is procurable of Merck & Co., of New York.

A most important consideration concerning the application, as it appears to me, is that the force of the current be not great. I have found ten to twenty volts efficient, and that this degree of force has been sufficient generally to produce the effect desired. For children I use ten or fifteen cells; for adults, fifteen or twenty cells. It is evident that if the voltage be high the necessary consequence must be the evolution of heat in the tooth, which may have some influence upon the after condition of the tooth. Thus far no secondary symptoms have appeared in my practice.

It may be interesting to give the history of four clinical cases, each of which were extremely sensitive to the lightest touch.

Case I.—Buccal aspect of lower bicuspid cavity broad but not deep; applied cocaine hydrochloride sixteen per cent., with the addition of two drops of carbolic acid. Selected twenty cells; controller-switch carried to 180°, or fifty-second pin. Time, fifteen

minutes; relief nearly complete, some pain being indicated at the extreme lateral margins when grooving.

Case II.—Small cavity in proximate surface of central, which had been cleansed, but the sensibility forbid completion. First applied cocaine hydrochloride eighteen per cent. for twelve minutes, which did not completely remove sensibility; then applied the citrate, same percentage, for a less period, with absolute relief. There was no record of the voltage.

Case III.—Lower bicuspid; occlusal surface denuded of enamel, apparently dense; cocaine citrate sixteen per cent., twenty cells, selected; time, twelve minutes. Considerable cutting was made to form cavity when some acuteness appeared; reapplied same solution with twenty-five cells for same period, when the excavation was completed without pain.

Case IV.—Lower molar buccal surface at cervix, including part of mesial aspect; cocaine hydrochloride twenty-four per cent.; time, twelve minutes of twenty cells, and continued eleven minutes more with twenty-five cells. Complete excavation and retention made without pain.

The two latter cases were typically severe ones, which required nearly twice the usual time. Dr. Allan, having been present, will be able to describe the results.

The President.—I now have the pleasure of introducing one of our members, Dr. Samuel A. Hopkins, of Boston, who will read a short paper on cocaine.

(For Dr. Hopkins's paper, see page 431.)

DISCUSSION.

Dr. Dawbarn was called upon by the president, and stated that while in the main he cordially agreed with the thoughts as expressed by Dr. Hopkins, yet he must differ regarding the view expressed as against the use of cocaine in surgery because of its danger. There is no drug of real value to us which is not a two-edged sword, and capable, if misused, of doing harm. This argument might with equal force be brought against ether anæsthesia.

He thought the use of cocaine in surgery was on the increase, and, used carefully and with certain precautions, it was safe. Personally, he had had no case of poisoning from its use, almost daily, for a period of several years. His colleague, Dr. Wyeth, at the Polyclinic School and Hospital, uses it even more than he, and at times for major operations, such as amputation at the shoulder, and liga-

tions of the subclavian artery, and regards a four-per-cent. solution as best for injection.

Dr. Dawbarn thought it a safe rule not to have more than one grain absorbed, and always precedes its injection by giving the patient a large drink of whiskey, or else a hypodermic injection of glonoin—also called trinitrin, and which comes in tablet-triturates of $\frac{1}{100}$ grain each—is given together with the cocaine. Either alcohol or glonoin will dilate blood-vessels, and thus balance the tendency of cocaine to contract them unduly and thus to cause anæmia of the brain.

Should symptoms of faintness arise, the patient should be placed flat, and given by the mouth two drachms of aromatic spirits of ammonia, in water, or more whiskey.

Whether, as Dr. Hopkins believes, there is a greater liability to unpleasant symptoms following the use of cocaine about the head than elsewhere he could not say.

Regarding the reference to Dr. Schleich, of Berlin, Dr. Dawbarn believed that his method of anæsthesia, produced by injection of extremely weak and almost infinitesimal doses of cocaine, is mainly a repetition of the work of Dr. Halsted, professor of surgery at the Johns Hopkins Hospital in Baltimore. Some twelve years ago he had seen Dr. Halsted remove a superficial tumor painlessly by the use of plain water injected into the skin surrounding the growth. Indeed, even before that time Bartholow, in his "Materia Medica," had, in the chapter upon "Aquapuncture," pointed out that water is anæsthetic to a considerable extent, and advised its use injected in contact with the sciatic nerve in obstinate sciatica.

Dr. Dawbarn remarked that he was greatly interested in electric cataphoresis, which he had used for opening felons, and similar conditions, a good many years ago. He believed that Dr. Frederick Peterson, who devised this term, credited him with being the first surgeon to do this. But it was a slow method, and he had subsequently employed cocaine, ethyl chloride, or other means, by preference. In dentistry, however, he could see the possibility of a brilliant future for electrolysis.

In conclusion, Dr. Dawbarn said that he should like to have the Institute take occasion to try one or all of the following anæsthetic drugs, hoping that among them may be found one superior to cocaine for dental work. These are—

"*Tropsin*" (first described by Schweigger, of Berlin, see *New York Medical Record*, October 8, 1892). A three-per-cent. solution produces eye-anæsthesia more quickly than does the same strength

of cocaine. It is obtained from the small-leaved cocoa-plant of Java. Chemically, tropsin is closely related to atropine, and is really benzoyl tropeine.

Brucine, obtained from nux vomica seeds; save that it is anæsthetic, it has the same action as strychnine, but is considerably less powerful than the latter.

Strophanthin, obtained from the seeds of strophanthus hispidus, which is the kombé arrow-poison of tropical Africa. Used internally, in proper dosage, strophanthus is a heart-tonic.

Erythrophlœine, from sassy bark (E. guineense), which is from Africa. Dr. Carl Koller, the discoverer of the properties of cocaine, has recommended it recently. (See *New York Medical Journal*, March 30, 1895.)

The President.—We will now have the pleasure of hearing from Dr. F. T. Van Woert, of Brooklyn, who has been kind enough to join us in this evening devoted to the consideration of "local anæsthesia," and who will not only relate his experience with cataphoresis, but will also exhibit the apparatus he uses, some portions of which, I understand, he devised.

Dr. Van Woert.—I want, in beginning, to correct the impression left by the remarks made by Dr. Bogue. From what he has said it might be inferred that the Wheeler apparatus for cataphoric medication is absolutely worthless. On the contrary, I know from practical experience that perfect results can be obtained by its use, and my only objection to it is that it is not quite as practical and handy for dental purposes as we could wish. The time consumed in its use is considerably longer than need be, and there is no positive accuracy in its registration.

The instrument which I have to present to you this evening has a maximum voltage of thirty-one and a half, or one and a half volts to a cell, there being twenty-one cells in the outfit. I am not in favor of the use of the street current for this purpose, and I find it is unnecessary, because the voltage required is so small, averaging from five to nine volts only, that the batteries are very much preferable and certainly are safer. The general construction of the instrument is such that the amount of pressure and the volume of current used can be divided and read without a technical knowledge of electricity; and to my mind the use of the milliampère meter, as well as the graduation of the current-controller, is absolutely necessary to the successful use of electricity for cataphoric medication. For instance, a patient presents himself, and we find upon application of the current a resistance of one-tenth of a milliampère in

volume against less than a volt in pressure. There can be no doubt that the resistance in this case is so high that it will consume a great deal more time than one where the milliampère meter would register three-fifths of a milliampère against three to five volts in pressure; from which you can readily see the necessity of being able to know the amount of pressure and the volume of current passing through the tooth. After my few months experience I feel that I am able to tell almost to a moment how long it is going to take to anæsthetize the part, simply by comparing the volume against the pressure of current consumed.

One of the most important factors in cataphoric medication is the proper conductibility of the medicament used. Professor Morton has recommended the use of guaiacol in connection with cocaine. Guaiacol I find, like all of the oils or fats, is an absolute non-conductor, and unless sulphuric acid or some chemical having high conductive properties is added, it would be of little use. I find in my practice the best results are obtained from an aqueous solution,—thirty per cent.,—or a saturated solution, of cocaine, with a very slight trace of chloride of sodium. The conductibility of plain water with a pressure of thirty-one and a half volts is just three-tenths of a milliampère to the half drachm,—that is to say, when thirty-one and a half volts are running through half a drachm of water the milliampère meter will show three-tenths of a milliampère, and a milliampère is a thousandth part of an ampère. Thus you can see that water is a very poor conductor.

It has been stated that bleaching of teeth is very much facilitated by the use of the electric current, and it is recommended that a twenty-five-per-cent. solution of pyrozone be used. Upon careful experiment you will find that pyrozone solutions, either five per cent. or twenty-five per cent., are absolute non-conductors, and the addition of the electric fluid does not hasten or facilitate the operation in the least.

One of the most difficult obstacles to overcome is found in the application of the current to the tooth. If it is to be necessary for a busy man to stand with an electrode in his hand from five to thirty minutes, that will very soon place cataphoresis on the top shelf in the back office. To overcome this difficulty I have devised several electrodes, made from German silver spring wire, which can be snapped into place and allowed to hang without the aid of an assistant, and the operator, after adjusting them, may proceed with other obligations of the day, leaving to the office-boy, girl, or assistant such slight additions of current as the case may require. Per-

sonally, I arrange my appointments so that patients with sensitive teeth that need this anæsthetizing process shall present themselves at least one hour before I am ready for the operation. I place them in an ordinary chair, give them something interesting to read or look at, and after applying the dam and making the proper connections with the apparatus, I go on with other appointments, leaving the patient in charge of my young lady assistant during any time that I may be occupied prior to their taking the operating-chair; then, when I am ready for the operation, the teeth are absolutely insensible to the feeling, and I am able to excavate and fill without the least demonstration on the part of the patient, from which you can understand that the time consumed in the operation will be at least one-third, if not one-half, less than if I were to attempt it without anæsthetizing the part. The only objection raised against cataphoresis is the time that it consumes, and if the time saved in the possibility of rapid operations following the cataphoric application be placed against the time consumed in its use, you will find that, by deducting the former from the latter, the time consumed in all will be very little more than it would be if electricity were not used, to say nothing of the great relief from nervous strain to operator and patient. I have come to look upon my Saturday mornings with as much comfort and freedom as any other day in the week since the introduction of this method, while prior to that time Saturday was a skeleton in my closet, and I have felt for many years that if I could ever acquire a competency, I would abandon the treatment and filling of children's teeth.

The anæsthesia of sensitive dentine and the extirpation of living pulps form a small part only of the uses to which this apparatus may be put. In the treatment of pyorrhœa alveolaris I make an application of cocaine to the soft and hard tissues for from five to ten minutes, after which I am able to cut and scrape to my heart's content without interference because of pain to the patient. Again if a case of acute pericementitis comes into the office, I immediately apply a half strength tincture of iodine by means of one of the little cup electrodes which you see here, giving about twelve or fifteen volts from three to five minutes, and if you try that you will find that in the majority of cases the pain will cease in a very few moments and the trouble entirely disappear. There are other cases in which cataphoresis may be usefully employed, as in the introduction of sterilizing or germicidal agents into the roots and tubuli of the teeth, the deposition of a compound of zinc and copper, known as electrolysis, for the destroying of sacs where pus is forming,

better known as alveolar abscesses, and in suppurative processes, such as pyorrhœa alveolaris. In short, the field seems to be unlimited, and I can hardly realize where it will end.

I shall be very glad to carefully go over the details of this matter, and the instruments presented, with any of the individual members after the meeting, and I may say that it is utterly impossible to give a description extemporaneously and without preparation which every one would understand.

I feel sure that cataphoresis has come to stay in dentistry. The man who practises without it is going to be considered a back number within a very few months, and he will find his patients drifting around the corner to Dr. Jones, his neighbor, for the relief which humanity has been seeking ever since science was known.

The president personally thanked all who had taken part in the meeting, and congratulated the Institute upon the large attendance and the great interest shown.

The Institute passed a vote of thanks to Drs. Dawbarn, Hopkins, and Van Woert for their valuable contributions.

Adjourned.

S. E. Davenport, D.D.S., M.D.S.,
Editor The New York Institute of Stomatology.

Editorial.

THE VACATION PERIOD.

The opening of the midsummer months is a period looked forward to generally as one of recreation, and the dentist, with the hours of increasing toil behind him, anxiously anticipates the time when the last patient has been seen, the office closed, and the rest of brain and body has begun.

It is unnecessary to elaborate upon the wearing character of the dental profession. Its sedentary work, the constant nerve-straining efforts with tortured patients, the hours of labor in unnatural positions, the overcoming of difficulties unexpectedly met with in practice, the anxieties as to results, all combine to make the practice of dentistry one of the most laborious men or women can follow.

The other side of the picture has, however, much that is attractive, so much so that very few are willing to abandon it when once thoroughly established. While its compensation financially may be inferior to many other professions, it is sufficiently remunerative to warrant earnest and continued application, while its pleasant environments and freedom from liability to the constant exactions of patients make it a preferable choice to the practice of medicine.

It is, unfortunately, too true that the practice of dentistry is not adapted to all constitutions, and it is equally true that its in-door work has been and will continue to be attractive to many who should select an out-door occupation. The sedentary life of the dentist is not fitted to those who have inherited or acquired tendencies to lung complications, and yet these, mistakingly too often, are found in the colleges preparing to accept this as the work of their lives. If the preceptors of these young men would do their duty in the premises, the ambitious, but not overstrong, would be properly advised; but it is very apparent to those who have had much experience in teaching that this is too often neglected.

It is possible that it might be an error of judgment to advise a young person not to adopt a profession for the reason given, but it would certainly be almost a crime to suggest its selection unless its dangers to an already weakened constitution were fully portrayed, as well as the probable remedy. That it is possible to practise dentistry in the face of much inherited physical weakness has been too often in evidence to need any argument; but when this has been successfully accomplished, it has been through an intelligent comprehension of the difficulties and the possibilities of overcoming them by effective sanitary measures.

It is an axiom in the active life of the world "that to the young all things are possible;" but this is simply an overstatement of a truth, that with youth, energy, and strength the world is an open arena for all such to make a place. In this sense it is true of dentistry as of all other occupations. To accomplish this, health is the first object of interest and not money. Where the latter overrides everything then the naturally weak must go to the wall.

It is pitiable to see young men with bent shoulders, hollow chests, and attenuated forms struggling over hysterical patients, and hourly, daily, and weekly going through this life-destroying work without the apparent consciousness that there is a limit to human energy, and that when the curtain is rung down prematurely and the family left to fight, as best it may, life's battles, the vain regrets will not suffice as a compensation.

What, then, may be the remedy not only for those who rejoice in their strength, but the physically incapacitated for hard out-door labor? It is, in a word, to moderate the desire for gain.

The idea too generally prevails that an hour lost in the working hours of the day is just so many dollars sacrificed out of the family treasury, and that, therefore, if in full practice, the engagement with the first patient must begin early and the last end late. Is it possible that such a day can be satisfactory, even admitting that the physical organism can endure it? It is certainly within reason and experience to infer that a nervously racked person is incapable of operating with either justice to himself or patient, and he has no moral right to fail in his best efforts. The remedy is plain that, aside from shorter hours, there should be a relaxation of overstrain some time through the working periods, and, in addition, the nervous system should be thoroughly braced for the day's work by exercise in the open air in the early morning, with a short walk at the noon hour in the sun.

With the present facilities of taking exercise, combined with exhilarating pleasure on the bicycle, there can be no reasonable excuse for the ills of a sedentary life.

The writer has been often saddened by the observation of wrecked lives in the dental profession through a lack of attention to plain sanitary rules well understood, but entirely neglected. Those who stand in the position of teachers or leaders of thought cannot too frequently or too strongly instruct the energetic youth seeking to enter our ranks that devotion to their profession does not include self-sacrifice.

In addition to the daily recreation there should be added the summer vacation. Let the office rest, close the doors, and hie away to the free air and life of nature in her more perfect surroundings. The active worker during the busy months of the year has but a limited time for literary pursuits, or even to meet the intellectual demands of his profession, and, as a result, dentists are, as a rule, not as intelligent as they should be on the subjects vital to their best interests or to the progress made in their calling. With one or, better, two months of freedom, there will be a positive gain, and all should take this amount to give time for recuperation and opportunity for rest and the cultivation of the mind on professional and collateral topics.

The annual conventions should be attended. Very few appreciate the energizing influence these have upon the work of the year. What but this can be the inducement for men to travel hundreds

of miles to attend a meeting, and nothing is able to draw their attention elsewhere. Certainly this incentive cannot be found in the scientific pabulum received, for this is often very meagre; but it is to be looked for in that contact with men engaged in the same occupation, the renewal of old friendships, and in that indefinable magnetism which comes with mingling in large bodies, filling and satisfying the nature as nothing else will or can. The life of a dentist without this seems to the writer poor indeed.

It is a subject for regret that so many absent themselves from these annual convocations who are the active spirits in their local organizations. This is a mistake, and should be remedied.

In July and August the two great national bodies—the Southern Dental Association and the American Dental Association—meet in separate localities. It is to be regretted that any dividing lines exist; but as these are not as yet closed up and one national body established, it should be the duty of those able to go, in both sections, to wend their way to these meetings. The young man may not find the first year satisfactory; but continue to go, and the value of professional intercourse will become apparent, and in the end the conclusion will be that a week with the national body is worth months of isolation. With renewed health and a brain rendered more active, the busy months of the rest of the year will go by with a feeling of thankfulness that a vacation was taken when most needed, and that the time was not wholly lost to the profession.

THE AMERICAN DENTAL ASSOCIATION.

This Association will meet at Saratoga Springs in August, and we would again urge members and delegates to use every exertion to be present. It is to be hoped, also, that a still larger number of those who have heretofore not taken any special interest in national society work will accept this opportunity as members or onlookers.

The idea is very general that Saratoga is an expensive place. This is true if the visitor puts up at the large hotels, but there are innumerable smaller houses, very comfortable, where rooms can be had at prices not above that paid at sea-side cottages.

It is with regret that at the time of going to press we have not received the official notice of either the American or the Southern Dental Association. The former meets, it is presumed, the first

Tuesday in August. The latter will meet at Asheville, N. C., at the Battery Park Hotel, Tuesday, July 28. Special summer excursion rates from there to Saratoga for those who desire to attend the conventions meeting at that place.

Bibliography.

The Principles and Practice of Dentistry, including Anatomy, Physiology, Pathology, Therapeutics, Dental Surgery, and Mechanism. By Chapin A. Harris, M.D., D.D.S., late President of the Baltimore Medical College, etc. Thirteenth edition. Revised and edited by Ferdinand J. S. Gorgas, A.M., M.D., D.D.S. With twelve hundred and fifty illustrations. Philadelphia: P. Blakiston, Son & Co., 1896.

The publication of the thirteenth edition of the Principles and Practice of Dentistry, the present year, is a sufficient indication of a continuous demand for it as a text-book. When this large volume is compared with the original of Dr. Harris's work the difference as to size and treatment of subjects is most marked. The changes in this book very correctly indicate the progress made in dentistry during the past half-century.

While in many respects defective as a text-book, it is not probably more so than the majority of such works prepared by one or two individuals.

While perhaps none of the present generation of dentists would care to see further editions cease to appear, it must be confessed that the operations in dentistry, even with the condensation made necessary here, have reached such proportions that no one man is capable of properly handling them. It is, therefore, presumed that the text-book of the future will be confined to special subjects, and this, in the opinion of the writer, is the only proper method. All extended works, embracing everything in dentistry, even when written in encyclopædic form, are simply books of reference, and take their places, as such, in every well-arranged dental library, both public and private, but can never become text-books in colleges.

This edition has been quite thoroughly revised by Dr. Gorgas, a most difficult task in view of all the obsolete matter contained in

the older editions, and not thoroughly eliminated in any of those published.

The portion devoted to "Dental Pathology and Therapeutics" is, upon the whole, well arranged. Criticism upon it must lie in the direction that it is too brief and not always satisfactory in its line of treatment. The following is quoted as an illustration. "An excellent application is composed of equal parts of the official tincture of iodine and tincture of aconite root, applied to the gum two or three times daily." Not a word of caution as to the use of the tincture of aconite root or as to the *rationale* of the operation. It is simply the old formula. A word of warning as to the possible toxic effects of this agent would not have been out of place in a work supposed to be for the use of students. The description of its application is not only inexact, but the use of aconite for the purpose mentioned, pericementitis, is to be condemned, for it certainly is a paralyzer of tissue, an effect to be by all means avoided in counter-irritation.

In the chapter on "Sensitive Dentine" the author still regards chloride of zinc as not being capable of producing "any deleterious effect on the pulp of the tooth," and this in the face of all the experimental knowledge obtained in the past two years on the effect of coagulants upon this organ.

Cocaine is not mentioned for this purpose, notwithstanding its known effect in reducing a hyperæsthetic condition in dentine more fully since the introduction of electrical osmosis, which was in its infancy when this chapter was, without doubt, prepared.

It is unfortunately the weakness of all books, of a practical character, that before the ink is dry on the pages new methods have been demonstrated and the reader is annoyed by omissions.

The use of bicarbonate of soda might have been stated, with advantage to all practising dentists, for the reduction of sensitiveness in dentine, for certainly no one having used this in the form of a paste—bicarbonate of soda with water—would neglect it as an aid in reducing this pathological condition.

The title of "Necrosis of Teeth," applied to the chapter devoted to partial death of teeth, is a misnomer, and should not have appeared in this connection. The methods of bleaching recommended are about as in the last edition, and equally imperfect and valueless for practical purposes.

It is impossible to extend this review further, nor is it necessary, as the work is too well known to require enlarged notice.

Obituary.

DR. W. E. MAGILL.

Died May 26, 1896, at Erie, Pa., of apoplexy, Dr. W. E. Magill. The death of this prominent and universally esteemed member of the dental profession occurred while apparently in good health and at work in his laboratory. He was born at Meadville, Pa., May 29, 1825, and entered as a student of dentistry in Dr. A. B. Robbins's office in Meadville in 1844. He commenced the practice of dentistry in the same place in 1848, and removed to Erie, Pa., two years later, where he was in continuous practice up to the time of his death.

Dr. Magill was a member of the Pennsylvania State Dental Society from its first organization, and at one time filled the office of president. He also was president of the Lake Erie Dental Society. For many years he has been an active and influential member of the Pennsylvania State Dental Examining Board.

The death of Dr. Magill leaves a vacancy in the ranks of the active workers in dentistry in Pennsylvania that will not soon be filled. His very clear, logical mind made him a power in the State and local organizations, and his earnest devotion to the best interests of his calling, together with his kindly feeling for his coworkers, made him always welcome in professional circles.

To the writer this death is a personal loss. Mingling with Dr. Magill for many years in the arena of professional society work, he had learned to appreciate him not only for his marked ability, but as a friend and valued counsellor.

The dental profession has lost in the past few years many of its brilliant men. While this must continue to be true in this ever-changing life, we never become reconciled to it, for seemingly many links have been broken in the chain never to be replaced.

Dr. Magill was married to Louisa Jones at Erie, January 15, 1857. He leaves a wife and three sons living,—Dr. W. J. Magill, of Erie; Edward S. and Charles J., of Chicago, and Louis J., of the United States navy.

Current News.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The Twelfth Annual Session will be held at Saratoga Springs, N. Y., commencing at ten o'clock A.M., Monday, August 3, and will continue in session during the proceedings of the American Dental Association. It is earnestly requested that all State and Territorial Boards of Dental Examiners will send delegates.

Charles A. Meeker,
Secretary and Treasurer.

No. 29 Fulton Street, Newark, N. J.

NEW JERSEY STATE DENTAL SOCIETY.

The Twenty-sixth Annual Session of the New Jersey State Dental Society will be held in the Auditorium, at Asbury Park, N. J., July 29, 30, and 31. Essays on subjects pertaining to dentistry will be read by the most eminent men in the profession. Twenty-seven clinics on the afternoon of the 29th will be of the utmost interest. Fifteen hundred feet of space for exhibitions already nearly filled. Many new electrical appliances for the first time exhibited. New Jersey head-quarters, the Columbia; rates, $2.50 to $3 per day. Board in the Park from $8 to $45 per week. Cut off the time and come and see us.

Charles A. Meeker, D.D.S.,
Secretary.

Newark, N. J.

ILLINOIS STATE DENTAL SOCIETY.

The Thirty-second Annual Meeting of the Illinois State Dental Society was held at Springfield, May 12 to 15, 1896. A good programme was carried out, and a large attendance was present. The following officers were elected: President, C. R. Taylor, Streator;

Vice-President, E. B. David, Aledo; Secretary, Louis Ottofy, Chicago; Treasurer, E. D. Swain, Chicago; Librarian, J. R. Rayburn, Fairbury. The next meeting will be held at Peoria, beginning on the second Tuesday in May, 1897.

LOUIS OTTOFY,
Secretary.

MASONIC TEMPLE, CHICAGO.

CINCINNATI ACADEMY OF DENTISTRY.

AT the regular monthly meeting of the Cincinnati Academy of Dentistry, held Monday evening, April 27, 1896, the following officers were elected for the ensuing year,—viz.: President, W. T. McLean, M.D., D.D.S.; Vice-President, A. I. F. Buxbaum, M.D., D.D.S.; Treasurer, J. F. Clayton, D.D.S.; Secretary, Wm. Lockman, Jr., D.D.S.

Selections.

REMEDY FOR LACERATION IN EXTRACTION.

IF any considerable amount of laceration has taken place during extraction, I attempt to replace the tissues by compressing with the fingers, or stitching into apposition any pendant portion of the gum, prescribing as a dressing,—

℞ Tannic acid, gr. xx;
Listerine, ℥iv;
Aquæ dest., ℥iv. M.
Sig.—Apply frequently to the wound.

—DR. OTTO ARNOLD, in *Ohio Dental Journal.*

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Original Communications.[1]

CLINICAL CONSIDERATIONS ON INFECTIOUS GINGIVITES.[2]

BY CHARLES GREENE CUMSTON, B.M.S., M.D.[3]

Inflammation of the gums may have either an acute or chronic course, but no matter which this course may be, the affection will take on the three following stages,—viz., stage of simple infection, stage of suppurative infection, stage of destructive infection.

Each of these stages can manifest itself independently from the others, according to the cause of the infection or the character of the soil in which it is evolved. Consequently, the single types corresponding to the three following affections are to be met with in practice,—viz., *simple gingivitis*, *purulent gingivitis*, and, lastly, *gangrenous gingivitis*.

I will pass these three types rapidly in review. Simple gingivitis has also been described as erythematous or catarrhal. The beginning of the infection is occasionally marked by a general malaise, but usually of so slight a degree as not to be remarked by the patient. Anorexia may be pronounced, as well as a dryness of

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the Harvard Odontological Society, October 31, 1895.

[3] Instructor in Clinical Gynæcology, Tufts College; member of the Société Française d'Electrothérapie; Director of the Department of Gynæcology, Tremont Dispensary.

the buccal cavity, the latter symptom calling the patient's attention to his month.

The mucous membrane is hot, red, and rather painful. Soon there is a difficulty in moving the jaws, the breath has a disagreeable odor, and salivation is increased.

If the mouth is examined, the gums will be found in a state of tumefaction and soft to the feel. A bright-red line, having a width of two or three millimetres, situated on the free border of the gums, is easily seen, as it contrasts markedly with the dark-red color of the remainder of the gums. Here and there a whitish film, covering the inflamed gums, will be observed, usually in the neighborhood of the teeth. Sometimes the glands will become indurated and enlarged.

This form of gingivitis is generally very easily and quickly cured; however, it can transform into the suppurative form, which I will now take up.

The suppurative gingivitis is characterized by superficial ulcerations, and is ushered in quite often by fever. The patient does not feel himself; he is tired, has loss of appetite, and complains of his mouth as being dry and painful.

Then movements of the jaws become painful, and even impossible, due to the ulcerations on the gums and the indurated lymphatic glands.

The pain becomes dull and steady, and the patient, who can neither eat, sleep, nor speak, becomes prostrated.

The physical signs are here more marked than in simple gingivitis. The transparent epithelium is raised up by a serous exudation, but which rapidly becomes purulent. The epidermis falls, leaving the swollen and thickened dermis bare. This surface bleeds easily, and is of a bright red color, unless, as it sometimes happens, it is covered by a kind of dirty membrane, in which alimentary *débris*, mixed with the products of buccal excretion and secretions, especially tartar, are to be found.

It is under this more or less thick layer that the superficial ulcerations form, and which, although they quite often remain circumscribed, may extend not only all over the gums, but to the internal aspect of the cheeks and lips as well. There is consequently great salivation and fetidity of the breath; the submaxillary glands become tumefied and most painful.

In eight or ten days this suppurative form will get well, under proper treatment; but if not, it passes into the chronic state, or becomes gangrenous.

Gangrenous gingivitis may succeed the preceding forms, but more often it appears at the same time in patients recovering from some debilitating general malady. Patients feel sick, and complain of cephalalgia, anorexia, and vertigo.

Hemorrhages from the gums make their appearance; the great quantity of saliva is most troublesome to the patient, who finds that his gums are painful, swollen, soft, and granular, while around the teeth notches will be felt. This is the first or fungous stage.

A whitish-gray deposit, a sort of pseudo-membrane, soon forms on the free borders of the gums, and underneath this are to be found ulcerations, which extend in size and depth, producing repeated hemorrhages and undermining the teeth, causing these to fall out. This is the stage of ulceration.

The infectious process continues its work. The mucous membrane, which was dark red, becomes earthy in look; blackish patches of necrosis become detached, leaving the alveola bare. This ravage may continue in every direction to such an extent that death is the result.

The functional symptoms undergo the same increase; anorexia and insomnia are complete; the patient can neither eat nor speak, so great are his sufferings. Diarrhœa appears, the pulse is small and frequent, and a dyspnœa shortly precedes the comatose state, in which the patient dies.

A quick and proper treatment will be able to save patients with gangrenous gingivitis, but a cure is infrequent when once the symptoms of auto-intoxication have appeared.

There are intermediate forms of this affection,—for example, vegetating fungous gingivitis and hypertrophic gingivits,—but these are chronic types, and have little tendency to progression.

I now come to the study of infectious gingivitis, properly speaking, and shall purposely omit the toxic and trophic forms.

Scarlet Fever.—An inflammation of the gums may occur between the tenth and the fifteenth day of scarlet fever. This is an infrequent complication; it may come on insidiously, but it may also be ushered in by severe general symptoms resembling a typhoid condition. The patient rapidly loses flesh, vomits continually, and an obstinate diarrhœa is present. The urine will be found to contain albumen. The pulse is small and rapid. Dyspnœa and delirium may supervene, and death is the result.

Scarlatinous gingivitis is quickly over in slight cases, and is characterized by tumefaction and redness of the mucous membrane, which readily bleeds.

The most frequent form in this disease is the ulcero-membranous gingivitis, which may become gangrenous. Pain is most acute, preventing movements of the jaw; the saliva runs away from the mouth, and the breath is very fetid. Yellow pseudo-membranes appear on the free border of the gums, covering the ulcerations, which may extend in surface and depth, producing necrosis of parts of the mucous membrane. The infection may invade the lips and internal aspect of the cheeks; the submaxillary glands are greatly enlarged.

The prognosis depends on the gravity of the lesions. Good when they are superficial, it becomes very bad when the infection becomes general. The alveolo-dental ligament may be invaded and destroyed, and the infectious process may even attack the alveolæ. Excepting in the last-mentioned cases, where the affection may be the source of secondary infections and of severe local lesions, demanding a considerable period for their cure, the gingivitis of measles disappears quickly.

Aphtha.—Chills, slight fever, headache, insomnia, and painful gums mark the commencement of aphthous gingivitis. The mucous membrane is red, bleeding, very painful, and tumefied. Soon the surface, especially around the implantation of the teeth, is covered by an eruption of confluent white vesicles, giving rise to superficial ulcerations. From the gums these vesicles invade the entire buccal mucous membrane. Sometimes the vesicles disappear, and there remain large patches of necrosed mucous membrane near the last molars, resembling ulcero-membranous stomatitis, while the borders of the gums are in a fungous and suppurating condition. In such cases the patient presents a typical typhoid condition, with gastro-intestinal symptoms, vomiting, and diarrhœa, while albuminuria, nervous symptoms, and adynamia are present. This gingivitis is most painful, and mastication is rendered still more difficult by enlarged glands, which may be considerable.

The aphthæ may be absolutely wanting; neither herpes nor ulcero-membranous stomatitis are present, and nothing but a pearly spider's-web membrane covers the gums. (Pètre.) All lesions disappear in from a few days to six weeks by antiseptic treatment.

Scorbutus is too well known for me to discuss it, and will only be mentioned here.

Gonorrhœal gingivitis appears any time during the evolution of specific urethritis; however, according to Ménard, it is towards the end of the malady, and nearly always following other infec-

tious complications that it is present. Thus arthritis, orchitis, and erythema precede the buccal symptoms of gonorrhœa. Then a great heat is felt in the mouth, with a continual thirstiness; the gums, especially the lower, are red, livid, tumefied, and bleeding, while the mucous membrane swells up between the dental arches.

Mastication and speech become difficult and painful; fever is quite high, and salivation and fetid breath render the patient's condition most disagreeable.

As the disease progresses a pseudo-membranous exudation covers the border of the gums, hiding the more or less deep ulcerations. The ulcerations are sharply cut and of a violet color. The internal aspect of the corresponding cheek presents at the same time, or successively, inflammatory lesions of the same nature. The lymphatics are enlarged.

Recovery from this gingivitis, which is not a contagion, but a *gonorrhœal infection*, is complete in about two or three weeks. The treatment consists in cauterizations and antiseptic irrigations.

I now come to the pathological anatomy of the gingivites, which is certainly too long to be discussed in full, but I will endeavor to give a concise description.

Redness of the gums indicates the commencement of inflammation; it may be bright or dark; there is tension and swelling of the mucous membrane. The epithelium falls, leaving the dermis bleeding and uncovered. The blood and lymphatic vessels are dilated, and a serous exudation quickly appears, soon becoming purulent. The pus-cells may appear at the surface of the mucous membrane before the epithelium has been cast off, and are sometimes seen between the tumefied cells, thus contributing to their necrosis and desquamation. The epithelium is not always washed away by the saliva, but accumulates in the smallest crevices, especially in the *culs-de-sac* formed by the tartar between the tooth and gum, and when lodged there contribute to the formation of ulcerations and fissures.

The mucous membrane often becomes fungous, and also—as, for example, in scorbutus—may be covered with vascular granulations. Usually it is covered by a pultaceous membrane, which conceals the ulcerations underneath.

The ulcerations vary in number, extent, and depth; they may remain for a long time superficial, as in tuberculosis, or rapidly invade the underlying tissues. They may be preceded by maculæ, papulæ, vesicles, or pustules, as in scarlet fever, measles, etc., while in other cases they are covered by pseudo-membranes, as in diphtheria.

The bacteria, which abound, act not only by their infectious and toxic properties, but by their agglomeration; they may prevent circulation by mechanical action. The blood-supply being thus cut off, the parts undergo necrosis, ulcerations form, and gangrene occurs.

The subdermic cellular tissue is generally in a state of œdema from the beginning of the gingivitis, while later in the progress of the affection it may be invaded by the infection and suppurate.

In some forms of the disease the secretions of the buccal cavity become very profuse, and even muco-purulent. This is due to an exaggeration of the activity of the glands of the mucous membrane, to which is added a sero-mucous exudation containing epithelial cells and leucocytes.

The consequences of a gingivitis are local and general. One of the most frequent local consequences is the generalization of the malady over the entire mucous membrane of the mouth. Diphtheritic gingivitis may be given as a type.

Gingivitis may cause the loosening and falling out of the teeth, due either to the propagation of the inflammation to the alveolodental ligament, resulting in its destruction, as in diabetes, etc., or, as is pointed out by Cruet, the alveolæ are first resorbed, and infection follows. If the infectious process continues, we have an acute osteitis of the jaw, its progress being rather rapid, with periods of remission and exacerbation. Suppuration occurs, forming sequestra, fistulæ, etc.

As the mucous membrane of the buccal cavity is very rich in lymphatics, it is easily understood how the submaxillary glands become involved. The adenitis may disappear with the gingivitis, but it can take on an acute type, in which case the periglandular cellular tissue becomes involved in the process. This periglandular inflammation may undergo resolution or suppurate.

Diffused phlegmon is very infrequent, and occurs in debilitated subjects. The prognosis is very bad, as death may occur from septicæmia.

Gingivitis renders alimentation difficult or impossible, and may in certain affections, such as tuberculosis, bring about death by cachexia. Salivation is also depressing, and does much to weaken the patient.

But the most serious consequence of gingivitis is *auto-intoxication.* This condition shows itself sometimes by gastro-intestinal troubles, vomiting, and diarrhœa. It may become so serious as to affect a typhoid type. In other cases the nervous system appears

to be especially acted on by the toxines. Godelier and Barth each report a case of gingivitis followed by adynamia and death.

The infection may attack some particular organ, producing serious lesions, as, for example, Brissaud's case, in which an infectious gingivitis was followed by endocarditis and broncho-pneumonia, with death to the patient.

The diagnosis of the infectious gingivitis will be passed over, as this paper is already too long, and I will close by making a few remarks on the prognosis and treatment.

The prognosis is generally a question of *soil*. No matter what the local factor of the inflammation of the mucous membrane may be, if the *soil* is neither infected nor intoxicated, nor debilitated in any way, the lesions will be slight and recovery rapid. On the contrary, if the local infection finds a soil profoundly impregnated by toxines or weakened by a diathesis, its progress will be rapid and produce most serious lesions, as I have pointed out. Consequently it is not on the advanced stage of the buccal lesions, but on the general condition of the patient, on which the prognosis should be based.

As to the treatment. This should be directed to two factors,—viz., the general condition and the local lesions. I cannot here mention the treatment of each infectious disease producing a gingivitis, but will simply speak of the local care.

No matter what variety the gingivitis may be, it is a microbic manifestation, and in order to cure it the bacteria must be attacked; this is accomplished by severe antisepsis of the buccal cavity. First of all, the tartar should be removed, as it is a real culture medium, and a gargle of carbolic acid, one in two hundred; thymol, one in one hundred; or a more elegant and agreeable preparation may be chosen, such as Metcalf's spray solution, or listerine.

The permanganate of potassium I can highly recommend for buccal antisepsis, and I prescribe,—

℞ Kalii permanganat., 0.50;
Aq. menth. pip., 40.—M.
Sig.—From eight to ten drops in a glass of tepid water as a mouth-wash.

The use of saccharin combined with salicylic acid has also a favorable action in these cases, the following formula being an excellent combination:

℞ Saccharin,
Natrii bicarb., āā 1;
Acid. salicylat., 4;
Alcoholis, 150;
Aq. menth. pip., 50.—M.
Sig.—Half a teaspoonful to a glass of tepid water as a mouth-wash.

For the fungosities cauterization by chromic acid crystals or nitrate of silver, applied on cotton tampons, should be practised. In some cases the galvano-cautery may be necessary. Chromic acid is, I think, perhaps the better, as its action is limited to the point touched, and the slough is eliminated in three or four days. The epithelium will have appeared in a week or so after.

When there is gangrene the foci should be destroyed by the galvano- or the thermo-cautery.

Such is the local treatment of the infectious gingivites.

A SYSTEM OF DETACHABLE FACINGS.

BY W. L. MASON, D.D.S., RED BANK, N. J.

Mr. President and Gentlemen,—I present to you to-night, for your consideration, a system of detachable facings for crown- and bridge-work,—a system that does not in any way change the appearance of the perfectly-made crown or bridge of to-day.

About sixteen years ago porcelain facings, soldered to gold bands, were put in general use, and closely after came the bridge-work, very crude at that time, but advancing rapidly to the almost perfect construction of to-day. I could say perfect but for one fault, and that is the uncertainty of the condition of the porcelains after soldering and cementing into position. I know that we have teeth to-day that stand the strain better in the process of forming them into crowns or into bridges, but they will never be made to expand or contract like metal. We may be very careful in heating an invested piece for soldering, and cool off properly, and try the piece in, and have no strain upon it, so we cement in position. As near as we can see we have a perfect piece of bridge-work. But, just as long as the piece is in service, the porcelains are apt to separate from their backings. I think it is a great necessity that we attend to the future conditions which are apt to happen with a porcelain on crown or bridge. There is constant

possibility of having a patient back with a porcelain broken off, and we should so construct our work as to replace damage quickly, not only to the patient's comfort, but also to our own.

I will acknowledge that I have never repaired a bridge in the mouth yet to my own satisfaction, where the porcelain was soldered to its backing. Is it practical to have a porcelain detachable? It must be, for scores have tried to produce them. Patent records show the efforts made. Up to the present time none have been invented so that they can be manufactured and sold to the dentist for his immediate use, and whether they are practical or not, I would leave for you to examine the mode of forming, and judge for yourselves.

In my judgment, a detachable porcelain is just as important to crown- and bridge-work as crown- and bridge-work is to dentistry. For a number of years I have been seeking a mode of constructing the porcelains so that they would be separate but have a perfect contact with the backings, and be equal to the facings now in use. Through that effort I have produced a system of dovetail and grooves to match, and a process of manufacturing whereby a porcelain is made independent of its backing, and a porcelain from one mould will fit each and every one of the backings made for that size mould, or universal in their use.

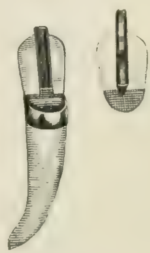
Before going further, I will call your attention to a few illustrations of the process.

Fig. 1 shows a lower canine crowned and cemented to its root. Fig. 2 shows its porcelain sliding from its backing. Fig. 3 shows

FIG. 1.

FIG. 2.

FIG. 3.



porcelain and backing separate. This illustrates the mode of constructing the anterior upper and lower six teeth. In Fig. 3 we have a metal dovetail fitted perfectly to the back of the porcelain, and extending a little beyond its cutting-point; it also shows its

solid backing with a groove to receive the dovetail. It will not be necessary to go into the detail of the construction of the parts, but only that part of the work that is left for you to finish, as the porcelains with the metal dovetail attached and the grooved backing are manufactured. The tooth with its backing is fitted to the band, by grinding out where necessary. Then wax the gold backing to band, and after wax is hard, take hold of extended portion of dovetail and draw from backing. The crown is now ready to invest. Be careful to fill up the dovetail groove and let investment material come over cutting-point of backing, so as to keep out all solder.

Heat up solder and cool as quickly as you like. After removing from investment, see that the groove is thoroughly cleaned and dried; also dovetail on porcelain. Now take some chloro-percha, quite thick, fill up groove, and force porcelain in position. Saw off (don't cut) the extended portion of metal dovetail. Then finish as usual. For use as a dummy articulate to position and join parts with wax. The condition for the posterior teeth I have changed somewhat. Fig. 4 shows a molar dummy, with its cusp and porcelain together, having the same general appearance of molar dummy in general use, with the exception that the porcelain takes up more space on its palatal portion, making a saving of gold.

Fig. 4.

Fig. 5.

Fig. 5 shows the dummy parted, giving a view of the joining parts of a solid gold cusp, the upper buccal portion sloping upward and backward towards the ridge, and having on its face a square pin extending forward and upward. Fig. 5 also shows porcelain with square hole extending from surface just above the cusp portion, upward and outward to receive square pin fitted to cusp. After placing cusp and porcelain together the dummy is ready to grind in position. Wax parts together, remove porcelain, and solder. Cement porcelain to pin, and finish as usual. The advantages gained by this method are many, and can only be appreciated by practice.

The first advantage will be that you do not have to place your teeth under the flame of a blow-pipe.

Second. You have a solid backing without bubbles, as all parts are dropped forged.

Third. You can heat up your invested piece quickly, and not have to take the usual care; also cool off quickly.

Fourth. The small amount of solder you have to use,—just enough to join parts together.

Fifth. Saving your porcelain from being etched by borax.

Sixth. You are able to fit a bridge, releasing the strain by cutting and resoldering, and not have the porcelain interfered with.

Seventh. The most important of all. The amount of time saved to the busy dentist will equal about half of the time spent in the old method, and being free from annoyance in spending part or whole of a day repairing a bridge, with this system the repair is but a matter of a few minutes. If you put a tooth of mould No. 22 on, and it should break, you may order an exact duplicate of same and slip it in position, keeping yourself in good humor, and giving your patient the greatest amount of satisfaction.

THE FUTURE OF DENTISTRY ELECTRICALLY CONSIDERED.[1]

BY G. H. GUY,[2] NEW YORK.

Mr. President,—When the zealous chairman of your committee first asked me to respond to the toast of "The Future of Dentistry Electrically Considered," at your annual dinner, it seemed to me that he had come to the wrong man for his purpose, and, while I appreciated the honor very fully, I felt compelled to decline it. But he wrote me again, so adroitly and kindly, that I could hardly do anything else but consent. I am confronted by two difficulties. In the first place, I can tell you gentlemen little that you do not know already, and, in the second place, I can see before me, like a warning beacon, that wise old maxim, "Never prophesy unless you know."

Neither you nor I can say very much about what the mission of electricity in dentistry is going to be, but we know that it is destined to fill a high place,—I hope. I am sure, and I believe that it

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[1] Read before the Central Dental Association of Northern New Jersey, April 20, 1896.

[2] Editor of the Electrical Review, New York City.

will satisfy the dentist as well as that of the public,—and that it is going to be comprehensive, pervasive, and beneficial, beyond any agency that has ever been known in the dental art.

As I propose to occupy but a very few minutes of your time, I shall confine myself to a brief reference to some of the departments of electrical work in which the members of the dental profession are likely to be deeply interested. In considering this question, it is a most hopeful sign that although until recently electricity has been but little employed in dental surgery, excepting for the driving of mechanisms, cauterization, the transillumination of soft tissue, or the illumination of cavities, yet the profession are taking kindly to it. A large section of your medical brethren are still regarding its progress and increasing popularity with distrust and blind unbelief. It is not long since, in calling on a leading fashionable physician in New York, I asked his opinion as to the likelihood of electricity being eventually taken up in earnest by the profession. He replied, "It will never be. I have tried it myself, and have come to the conclusion that there is nothing in it." The whole electrical apparatus of this physician turned out to be a small faradic battery, and he had been treating all ailments with the same kind of current. There are thousands of practitioners who still think as he did. But there are many signs which go to show that the progressive and intelligent section of the dental profession are advancing with the times, and I was struck, and very much gratified, when attending the Dental Convention, last year, at Asbury Park, to see the intense interest and appreciation with which the papers discussing electrical problems were received.

I read not long ago about some electrical experiments upon floating organisms. If a galvanic current be passed through a bath containing paramecia in sufficient abundance, a curious sight is observed. When contact is made, the whole crowd of paramecia fall into order with their noses towards the cathode, and begin to swim towards it in converging curves, while, if the current be reversed, the crowd breaks up, all its units turn around, and begin to swim away, as if of one mind, from the new anode to the new cathode. The creatures are evidently more "comfortable" when swimming with the electric current than the reverse way. In another experiment, a number of tadpoles were put into a lantern bath. They began to move about very leisurely, and to jostle each other in all directions. On sending a current of electricity through the bath there was prodigious excitement. As Dr. Waller, who conducted the experiment, described it, "The tadpole community seems to

have gone mad, a writhing mass is all that can be distinguished; but the disturbance does not take long to subside, and now all the tadpoles are fixed as if at attention, heads to anode,—viz., traversed by a current from head to tail, stroked down the right way." It appears to me that the dentists, like the tadpoles, have begun to find that it is wise to yield themselves to the current of electrical progress that has set in; it points their heads the right way, and means, in the long run, less trouble, better work, and, last but not least, relatively better pay.

One of the great drawbacks to the adoption of electricity in general dental practice is the cheap outfit and the poor installation work. Any man who can put up an electric bell now calls himself an electrician. If it were not for the inspection department of the Board of Underwriters there would be, from bad wiring, such a crop of fires in large cities as would render the lighting of the streets entirely unnecessary. But there are no such official restrictions and precautionary measures for the protection of the dentist. Beware of cheap outfits. Do not try to save a dollar or two in your battery plant; get the best that is in the market. Go for your motors and your dental equipments to the best houses, that spend money on experimentation instead of letting you pay for it directly, and that insure careful inspection and sound installation, and do not subject you to the curses of defective wires, poor plugs, and inferior tackle of every description. I know of an instance in New York where the dentist had the hard luck to be taken in hand by a cheap, so-called electrician. Before he got through he spent five hundred dollars in his electrical outfit, and then he threw it up and vowed he would not have anything more to do with electricity, as it was a real fraud. Therefore, I say, dental electric outfits are like bicycles; if you want one to wear well, run smoothly, and save lurid language, get the best you can lay your hands on; you will get gratifying results, and you will not have any hard things to say about electricity.

Now, as to the electrical possibilities of the future in dentistry. Although we cannot gauge them, we have been lately getting some glimmering as to the trend they are likely to take. I wish I could help saying something about cataphoresis, but I cannot. Dr. Morton and Dr. Gillett have, I suspect, so worked you up to a keen edge on this subject of cataphoric work that the mere mention of that somewhat clumsy word may have the same effect on some of you that "rats" has on a skye-terrier, or, as they say, that "atrocities" has on Gladstone. I am trying to steer as clear as I can of all

technicalities, either dental or electrical; but, if I have to talk "shop" for a minute or two, I trust you will forgive me. The coming work in cataphoresis will not only be vast in extent, but marvellous in its general bearing on dental practice. Many occasions constantly arise where anæsthetic drugs may be introduced into tissue and into dentine, and also other drugs, such as iodine, etc., may be used in the same way, and their familiar topical effects be vastly enhanced by the aid of electricity. It is impossible to define the limitations of this great aid to the local application of drugs within the cavity of the mouth. Broadly, it may be said that any drug that has been previously used without electricity within the mouth to produce specific effect may now be electrically used with tenfold its former power for good. The subject of cataphoresis is already very wide, and I am not going to enter further upon it. I would, however, say, as it leads up to another point, that the question of the resistance of the liquid used has a most important bearing in the therapeutical applications of cataphoresis. If the resistance is too high, as with chloroform, sulphuric ether, alcohol, glycerin, etc., little or no current is conveyed, and no cataphoresis takes place, while on the other hand, if the electric resistance is too low, as with strong saline and acid solutions, much current passes, but little or no cataphoric action takes place. Now, you are all familiar with the points of the late discussion on guaiacocaine. It may be, and undoubtedly is, an excellent anæsthetic, but it is ill-smelling and escharotic, and none of you like it. It has been proposed to add glycerin to it, but Mr. Wheeler will tell you that he does not like *that*. If the resistance is thus increased, more current will have to be used, and Mr. Wheeler, I am sure, does not want to spoil the record of his volt-selector, which is destined to be one of the standard instruments of the dental office. Dr. Morton, however, has found a way out of the difficulty. He says that guaiacol alone, and other similar substances and derivatives, in themselves non-conductors of electricity, by the addition of a very minute quantity of some innocent substance of an electrolytic nature, like salts of caffeine or quinine, or any salts of the alkaloids, may be caused to penetrate tissue by the aid of electricity, and thus exhibit anæsthetic effects unobtainable without the aid of the added electrolyte. But this is one of the points that you gentlemen will have to straighten out before the best results from cataphoresis can be reached.

Further developments in the uses of the different kinds of currents is another subject which is too comprehensive to be discussed

here. I may, however, promise that the sinusoidal current will sooner or later find its way into dental laboratories. As you know, a dynamo-current is uneven, but the sinusoidal, with its very high vibrations, has soft, wave-like impulses; the current is agreeable and soothing to the patient, and more horse-power of electricity can be administered than if the frequency were lower and the wave less symmetrical. For example, the present sinusoidal machines run up to two thousand alternations per second, whereas the alternations per second of an induction coil would be, probably, at their highest limit, five hundred per second. Added to that, the graphic curve from the induction coil would be comparatively unsymmetrical,—*i.e.*, irregular. It is these two elements, the frequency and the graphic curve, or, as D'Arsonval calls it, "the characteristic of excitation," which determine whether the current is painful or not, and it is pain only which limits the extent to which the induced currents from ordinary medical apparatus may be administered. On this hand, I may mention, that guesswork in electrical dosage will soon be a thing of the past. The time is approaching when electricity will be prescribed and administered not only in measured units of intensity, density, and time, but with definite ideas of the electromotive force-curve, and of the therapeutic indications that a given curve may be expected to fulfil.

There are many other branches of electro-dental work in which we are on the verge of epoch-making improvements, and among them are the important ones of transillumination, implantation, and sterilization. For the purposes of transillumination, it is probable that more attention will be paid to the intensifying of the light. For instance, instead of confining the lamps for that purpose to small candle-powers, they might be run up to, say, twenty candle-power. Until lately, the difficulty has been that candle-power produced heat. This has been practically overcome by inclosing the first bulb in a second bulb through which water is made to flow. But here comes the fascinating question of the part which the phosphorescent or "etheric" light, the "Tesla glow," or, as it is also called, "the light of the future," will play in transillumination. I had the pleasure, about two years ago, of seeing in Mr. Tesla's laboratory a demonstration of the then newly-developed phosphorescent light. The room was darkened, and electrostatic currents played into it at the rate of possibly a million vibrations a second. Vacuum tubes, in fancy shapes, lay all around, and as these were taken up and lifted into the "field," they burst forth into beautiful luminescence, and the room was illuminated. Tesla

then prophesied that it would not be long before our houses were lighted without wires, and even without lamps, and that the night would be made as day by means of phosphorescent light caused by the play of current through air-exhausted tubes. Last year a photograph of Mr. Tesla was taken by this light. As a photograph it was not much to boast of, but as a piece of history, it was most interesting. It was the first time that a photograph had been taken by that light. That line of work was taken up by a man in your own city, Mr. McFarlan Moore, who in the short time that has since elapsed has so developed it that he published a week or two ago a bold and striking picture, possessing the clearness and strength of a daylight photograph, which was secured by a three-minute exposure under the new light in his laboratory. If such strides can be made in twelve months, and we are coming at such a rate nearer to the electrician's and, for the matter of that, the dentist's ideal of light without heat, I think it may pay the dentists to let their spirit of investigation drift in the direction of transillumination by phosphorescent light.

Electricity, as an agent in implantation, etc., of teeth is a very attractive subject, and we are on the eve of great developments in this field ; but I must not detain you longer.

There is, however, an incident, of which I should like to tell you, which bears on another important branch of work,—sterilization. Some time ago a German physician wrote to Mr. Tesla and said that he had been experimenting with the play of etheric light on the bacilli of tuberculosis, and not only had he killed the microbes while experimenting, but he hoped by the same means to cure tubercular developments in the human subject. This letter, sad to say, was burnt up in the fire at the laboratory, and Mr. Tesla has never been able to find where it came from. Now, gentlemen, you will see how beautifully this bears on the question of sterilization : pyorrhœa alveolaris should have no further terrors when it can be swept out of the human jaw with a brush of glowing phosphorescence, and a new charm will be given to dental work when light will not only illumine, but purify and anæsthetize, and even kill the germs that work havoc within the mouth.

And now, the Röntgen rays,—no speech to-day is complete without something about them. I do not think any of us yet realize what they may mean to dentistry. If it can be established that the cathodic rays will, like light, kill microbes, you see at once where it carries you to. There is one thing, however, that cathodic rays have done that you gentlemen, I am sure, will take

careful note of. They have passed through ivory and photographed pieces of metal on the other side. Where roots and other parts of the teeth are being treated, it is often necessary to know which teeth already contain fillings. There is now no further difficulty about this. As metallic substances intercept light to a greater degree than bone does, a cathodograph will show the location of all the fillings in the teeth which have already been operated upon. Dr. W. J. Morton has proposed to put the Röntgen rays within the cavity of the mouth, and a sensitive plate within the plate-holder outside on the cheek, and thus reproduce the teeth *in situ*, roots, fillings, etc. In this connection, it would also be possible to determine the existence of osteitis, deformations, pus-deposits, etc., in fact, the whole concealed pathology of the teeth in their relation to the jaw and gums would be thus revealed.

In conclusion, Mr. President and gentlemen, I would say, This subject is to me an intensely interesting one, and I shall watch keenly the new developments of electricity in dentistry. But among the names of those who will make their mark in this field, I shall look with very earnest expectation for some of the members of the Central Dental Association of Northern New Jersey, and I am confident that I shall not look in vain.

AN ORAL CAMERA FOR RÖNTGEN PHOTOGRAPHY.

BY WILLIAM ROLLINS, BOSTON, MASS.

UNTIL some better converter is found for the Röntgen rays, the visual examination of the teeth will give less perfect results than the photographic.

A dentist will therefore need, in addition to the converter shown in the July number, a separate camera, because where the instrument is used only for photography it may be smaller, and cause less inconvenience to the patient. Fig. 1 shows such a camera full size. It consists of a hollow metal handle, *MH*, a flexible sliding brass rod, *BS*, held in any position by the set screw *SC*, and supporting the camera-cell *CC*. Fig. 2 shows the back of the camera. The hardened steel boss riveted to the camera-cell has a threaded cavity into which the brass stem screws. This is simpler, smaller, and more rigid than a ball-joint. Bending the brass stem allows the camera to be placed in several positions. When this stem breaks

Fig. 1.

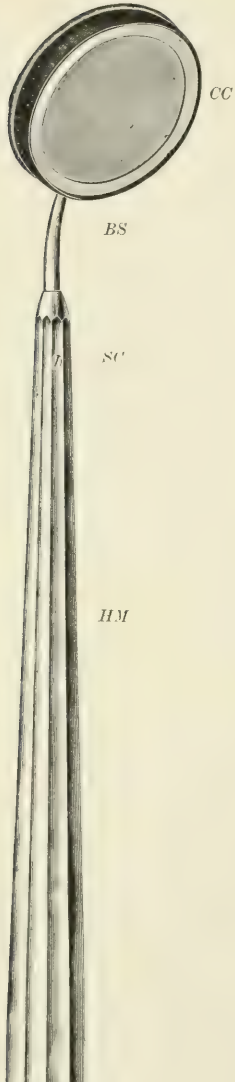


Fig. 2.

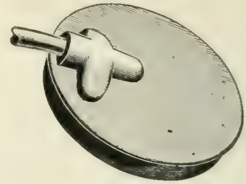
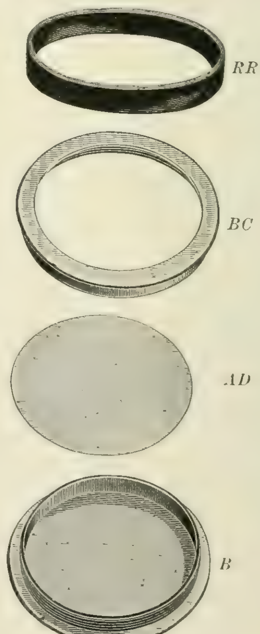


Fig. 3.



from frequent bending a new one can be inserted in a moment, the thread in the steel boss cutting a thread on the brass as it is turned in. Fig. 3 shows the camera in pieces. *RR* is a soft rubber ring, clasping the collar *BC*, when in position, as shown in Fig. 1, thereby preventing painful pressure on the mucous membrane. *AD* is an aluminum disk, which, when the brass collar *BC* is screwed on *B*, closes the camera light and water tight.

The instrument is to be used like the one described in the July number. A very simple form of camera can be made in the following way: Cut the sensitive films from kodak tissue, making them seven-eighths of an inch wide and an inch and a quarter long. Arrange them, after rounding the corners like the leaves of a book, and slip into a little envelope of black paper, and enclose them in a rubber cot, closing the end by folding over and securing with a bent steel wire. This sort of camera is very flexible, and is easily held against the mucous membrane with the finger. Whatever form of instrument is used, the best results are obtained by getting the sensitive photographic surface as near the point to be photographed as possible, and using that form of tube in which the rays are given off from a small intense source.

The uses to which Röntgen's discovery can be put in dentistry are many. It makes at least one new operation easy. Where a temporary tooth has remained for several years after it should have been shed I have always felt in doubt about the best course to take when it was a front tooth, because it was impossible to tell whether there was a second tooth under it.

Röntgen photography solves this problem, and enables us to remove the first tooth and open the socket of the second tooth to allow it to erupt.

In the September number of the journal I hope to describe and figure some of the simple generators I have devised for producing the electricity for lighting the tubes.

THE QUALIFICATIONS NECESSARY FOR THE DENTAL PRACTITIONER.[1]

BY DR. P. T. SMITH, DENVER, COL.

So much has been said and written upon this subject under various headings that it might seem well-nigh useless, or perhaps tiresome, to listen to the result of an effort to formulate any new ideas that may direct our thoughts over a subject seemingly so thoroughly analyzed, but rejoicing over the fact that good has been developed by the energy thus expended, and recognizing that much yet remains to be done, it is fitting that we recall to our minds the history of the past for the benefit of the future. The limited vantage ground occupied to-day sufficiently widens the horizon of our future duties and demands, to determine the course we must follow to place the profession on a footing of undoubted usefulness. The cause of the narrowed sphere of dentistry is readily recognized and easily defined, and should lead us to an honest acknowledgment of the peculiarities of the situation, and stimulate us to assiduous efforts towards an improved condition.

It is not a polymathic subject with a question as to which is right. The true position is easily demonstrable logically and practically, leaving no doubt as to the proper course for the profession to follow.

It has been argued by a respectable faction that dentistry is not necessarily a part of the medical profession *per se*, but an independent and distinct body with title and functions bearing distant collateral relations. This unfortunate and unwarranted conclusion greatly increases the unjust subordination of the dental curative department, and gives force to the sentiment of our limited professional curriculum.

Let us see our duty as unselfish eyes may easily do, fighting down mercenary and sordid ambition that saps the growth of the purer form of life.

The dental student should only be taken from the ranks of the medical profession, commencing the study of the specialty where the completion of the necessary foundation for the medical diploma left off.

All branches of the parent profession derive support and development, and necessarily produce fruitage, for evil and good in

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[1] Read before the Colorado State Dental Association, June 11, 1896.

proportion to their dependence and helpful support from the main trunk. A complete medical knowledge for the dentist creates a power of conception important and necessary in diagnostication of preliminary inharmony which effect otherwise conditions of the peripheral tissues that fall particularly under their care.

Almost every duty devolving upon the dental practitioner needs for its best accomplishment the support and guidance of a complete medical knowledge. It is a necessary mental discipline for the fullest analysis of the merest and most commonplace function he is called upon to discharge. No two individuals represent the same physical condition, and he may be without sufficient skill to exploit a true diagnosis, such as can most easily and surely be done by aid of a full medical understanding.

There could be much realized by the compulsory attendance at our dental offices if the watchful proprietor at these offices was universally a medical graduate, and had taken this degree, as he always should, prior to his passing the threshold of the dental department. Our dental colleges are pursuing an entirely wrong course in the method of their teaching. The result is a lame, unfinished, unsupporting, misleading delusion, which strands the hopeful, well-wishing, conscientious student on the reefs that beset the path of their future course through life. But a small per cent. of the practising dentists have had the ambition to voluntarily endow themselves with the necessary mental pabulum so needed and obtained in a medical course.

The medical profession recognizes this lack of thorough education necessary for the demands made upon us. They realize that all and nothing short of a complete course which bears upon every specific point must be shown in our curriculum before we can be eligible to our full duties and their recognition.

For the fullest and most honorable fruitage of our calling, a great change must be adopted in our process of selecting material and preparing new dentists for the great future welfare of the people,—the dignity and fellowship of the profession.

There should be but one profession, and that the medical, from which many radiating specialists can diverge with their respective distinctive titles which shall be adjunctive. As the fountain cannot rise higher than its source, we must expect to receive a credit only commensurate with the amount of education represented in our present limited course, and while these pseudo-dental colleges are permitted to exist and dole out half mental rations, filling up the country to the four winds with sophisticated swaddlings, we

may cover our faces with shame and sink to the common level of the uneducated wage-earner, and accept the pittance deposited upon our professional sacrificial altar. Then the shoemaker, the barber, and the dentist may walk hand in hand, financially and socially, with no hope beyond the realm of abiding ignorance.

When dental colleges all through the land are denominated respectable by a national college faculty association, and will turn out dentists with twenty-eight to fifty didactic lectures in the course of three years on some of the most important subjects, and the disinterested medical professors teaching these same dental students will pass them, at their final examination, on a thirty to a thirty-five per cent. examination, then our hopes may really sink below the evening clouds of despair. There is no attempt at technics applicable to the course prior to selecting or training students; no careful or trained clinics. The people have a right to demand true professional representation.

The mechanical department must be entirely sequestrated from the specialty. It now serves to clog and hinders the true advancement of the profession.

I notice at the colleges, and usually with the incipient practitioner, that the prosthetic, so-called, is regarded as the acme of their common ambition. And even with this, I think I may truthfully say, I never saw but one man who knew prosthetic dentistry, and who was able to place it in a technological aspect.

So great is the unwarranted and sordid ambition of all men, especially Americans, to coin every effort and faculty of our existence into money, counting the measure of our success wholly by the volume of its accumulation in our possession, that no elevation of our specialty above this murky position is possible until we have unshackled our fettered souls, and learn to adore the shrine of a more noble purpose which shall uplift us far above the grovelling level of mist and darkness.

I blame the colleges for much of our benighted condition. There are ten times more of the poor, sickly excuses in existence than is demanded. They forge their mercenary course along by solicitation, advertising, and begging throughout the country for students, for the sole purpose of embellishing the names of some people with an unwarranted prefix and the amount of money which can be realized from the method.

Abstracts and Translations.

A CASE OF CALCIFICATION OF A WIDELY EXPOSED PULP.

BY MR. CHARLES S. TOMES.

The specimen to which I would call your attention is one so remarkable, and also so instructive from several points of view, that it will fully repay somewhat close examination.

The tooth is one which, having been broken right across its pulp-cavity, has, nevertheless succeeded in repairing the damage and sealing it up again, an event of such rarity that I only know of one other recorded case,—namely, that to be found figured in my father's "Dental Surgery," third edition, page 341. Had my specimen been quite unique I should have hesitated to cut it up for microscopic examination, and then should have missed what, to my mind, are the points of greatest interest it has to show. The tooth is either a lower wisdom or a somewhat small second molar, the loss of the neighboring teeth rendering its exact determination impossible.

The patient is a servant of a patient of mine, and was brought to me on account of very severe but intermittent pain of a neuralgic type, recurring most days, but not every day. I found a tiny opening in the gum, which was otherwise of healthy appearance. A probe introduced disclosed the presence of what felt like a complete but rather rough-surfaced tooth. The history was that some three years previously an attempt had been made to extract a tooth in this situation, but that it had been broken off. It was exquisitely tender, and occasionally very painful for a long time afterwards, but it gradually got better and healed over, but it never remained absolutely comfortable for long together, although the severe paroxysmal pain which brought her to me was only of a few weeks' standing. With the aid of cocaine I reflected the gum from over it, and subsequently had no difficulty in removing it with an elevator. I then found that it had been transversely fractured a little way above its neck, and that what should have been an open pulp-cavity was occupied by a cauliflower-shaped mass of shining polished ivory projecting above the original surface of fracture and overflowing onto it. By cutting it carefully with a hair saw I was

able to get four good longitudinal sections, and found that the pulp was not wholly calcified, but that a residue of the pulp-chamber was still occupied by living pulp. On examining it with a low power, the large mass of secondary dentine was found not only to project a good way above the general level of the fractured surface, but also to have, so to speak, overflowed it all round the orifice of the pulp-cavity, and to be everywhere closely adherent to—indeed, continuous with—the old dentine. Roughly speaking, its structure may be thus described: its free or upper surface presented distinct lamination parallel with the surface; next came irregular lacunal spaces; then sparse dentinal tubes; and, finally, in its deepest portion—which was inside the original pulp-cavity—abundant dentinal tubes, which were in places continuous, though oftentimes joining by an abrupt bend, with the dentinal tubes of the original dentine. The overflow onto the fractured upper surface of the original tooth in places was slight, in other places it extended in a gradually thinning layer out to the very edge of the tooth; but what was especially noteworthy was that there were included in the new calcified growth quite a number of entirely detached and displaced splinters of the old dentine.

To proceed to a somewhat more detailed description of the new tissue.

The Laminated Outer Layer.—This consists of laminæ parallel with the surface, and varies in thickness, reaching in places $\frac{1}{250}$ inch, and containing about ten well-marked layers. Here and there it constitutes the whole of the overflow, and it contains some canaliculi, taking a direction perpendicular to the surface, and a few well-formed lacunæ with their canaliculi. It is present everywhere, though its amount and the distinctness of the lamination are variable.

The Lacunal and Interglobular Spaces.—The tissue immediately below the laminated layer is characterized by an immense number of lacunæ and interglobular spaces, which are in parts well formed and in other parts very coarse and irregular.

The fine boundary of this region of lacunal spaces is in places well defined, and terminates with bodies of the encapsuled lacuna type; elsewhere it passes insensibly into the region occupied by tubes, in the outer part of which latter region interglobular spaces are abundant, and are somewhat irregularly disposed.

The Tube System.—In the centre of the tooth the tubes, like those of normal dentine, run vertically upward towards the surface, while towards the sides of the new mass they radiate out-

ward, passing thus beyond the limits of the fractured old dentine, and spreading themselves fan-like over the edges of the original tooth to a certain extent.

In that portion of the secondary dentine which lies within the old dentine (which latter constituted originally the lateral walls of the pulp-cavity) the tubes run more or less outward, and are joined up into continuity with the old dentinal tube, there being generally an abrupt bend and some dilatation at the junction.

It will thus be seen that the whole boundary of the resultant pulp-cavity, formed at its sides and below by the original dentine and above by the new secondary dentine, is formed of dentinal tubes of normal appearance, and that the pulp, though diminished in bulk, has almost perfectly normal surroundings over nearly its whole area.

As the tubes run outward they become more widely separated, owing to their fan-like spreading; it is noteworthy that there are not a greater number of tubes in the expanded portion, but that the interstices between them become larger. A good many short lateral branches are given off, such as those which occur abundantly in the dentine of the roots of normal teeth.

Towards their outer extremities many of the tubes show longitudinal dilatations, and are joined up to the canaliculi of lacunal spaces; some end in brush-like expansions, while others terminate in loops, the loops being common to two or more tubes; others are sharply bent back on themselves. At and above the ends of the tubes fine globular formations may here and there be very distinctly seen.

The Included Splinters of Dentine.—As has already been mentioned, this specimen is probably unique, in that the secondary dentine mass contains quite a number of little detached pieces of the original dentine of the tooth which were splintered off in the original attempt at extraction, and which have become solidly inclosed in the new formation.

They have been displaced in various ways, so that their tube systems run in all sorts of directions, and are in no way conformable with the tubes of the new growth. But they have, in their irregularity of position, this much in common, that the tubes of the new growth, when they are of any size, do not pass beyond them, but terminate beneath them. To this, however, there are some exceptions, where quite small chips appear to have been driven more deeply into the pulp.

Upon the whole, then, it may be said that the broken fragments

of old dentine either lie embedded in the region of lacunal spaces, or between this and the commencement of the tube system. It is not a little remarkable that none of the fragments show the least sign of absorption, but that their edges are left quite angular, just as they were broken off. Where the tubes commence close against the fragments, they are bent about, obviously with relation to the included pieces.

Marks of Absorption.—It is notable that notwithstanding the violent irritation to which the pulp was subject, in very few places can any mark of absorption be found.

The occurrence of "encapsuled lacuna"-like forms has already been mentioned where the lacunal region merges into that of well-formed tubes, but a few marks of absorption and subsequent calcification are to be found elsewhere, and in unlikely places. Thus under the calcified overflow are some pits occupied by Howship's lacunæ.

Every one must, I think, agree with me in astonishment at the extraordinary vitality of this pulp and its amazing success in repairing damages, and it is worth while to examine, or at least to speculate, upon the conditions under which this took place. The whole roof and a little of the sides of the pulp-cavity had been torn off, and the pulp thus widely exposed, apparently a little below the edge of the gum. This must have been temporarily protected by the formation of a coagulum, and ultimately by the contraction of the edges of the gum and its almost complete healing over it, and under these conditions its extraordinarily successful calcification went on.

Is there not a practical hint to be derived from this? Here was a lacerated pulp with loose fragments of sharp splintered dentine jammed into it, coated over only with coagulum, and it did not die nor inflame, but calcified. I think that in capping a pulp, and especially a traumatic exposure, we should probably do better to avoid wiping away any blood or exudation, but leave the effused blood to coagulate ; we can put nothing better upon the pulp surface. And probably, when we do commence to cover it, we should do best to put something organic,—sterilized fibrin or gelatin, for instance,—and I shall certainly try such a course of procedure when the opportunity offers, and refrain from placing in contact with the pulp either inorganic materials as a vehicle for medication, or any strong medicaments.

But there is another and less hopeful side to the suggestions presented by this case ; there was almost complete success in the

formation of secondary dentine, with absolutely no loose nodules or irregular encroachment on the pulp; in fact, precisely the condition which we hope to obtain when a pulp is capped; and yet it is not comfortable, and notwithstanding its full protection under the gum, it became the site of very characteristic pulp-irritation, and consequent neuralgic pain.

Was this an accident? or is the capping of pulps to end in this way usually? Clearly we can hope for no better results in the way of repair; yet why did it become so painful? For all that we can see post mortem, the immediate surroundings of this pulp had become almost exactly those of a healthy pulp, with its dental tubes radiating from it.

Another set of speculations of a more theoretical kind arises. How was the calcification done? Ordinarily the odontoblasts would be torn off and remain adherent to the portion of the tooth which was broken away in the attempted extraction. Were they not torn off, or were they reformed, or was it all done without odontoblasts? If so, then dentinal tubes can be manufactured without odontoblasts, which, from what we know of the process, does not seem likely. But in any case, the first-formed or outer layers are laminated, unlike anything which happens in normal tooth-formation. Were these laminated layers a plastic exudation shed out from the wounded pulp, subsequently organized and finally calcified? I confess that this idea rather commends itself to me, as it would give an easy explanation of the way in which the new tissue flows over the fractured surfaces exactly as if it had got there in a fluid form.

One section seems to afford clinical proof that the material which subsequently calcified was originally fluid. A piece of old dentine has been raised at one end, but left attached at the other, just as happens if a chisel is driven into wood nearly parallel with its surface, but the chip not detached. This has been glued on by something which ran in right under the raised portion with a degree of completeness which strongly suggests its original fluidity.

The same idea is equally strongly suggested by the manner in which the overflow, subsequently calcified, ran out in places over the whole fractured top of the tooth, reaching even to its very outside in a gradually thinning-out layer.

So far as it is possible to read the history of events this appears to have happened. The roof and part of the sides of the pulp-chamber were torn off, and the exposed part, probably retaining its odontoblast layer, swelled out somewhat from the orifice (as

indicated by the fan-like expansion of the tubes), and shed out, as it certainly would, plastic exudation over its whole surface, which flowed out over the top of the tooth left. This plastic exudation became permeated by migrating leucocytes, and in and under it the fragments of dentine were inclosed. This was protected by blood-clot, and ultimately by the healing over of the gum, etc. This organized exudation afforded the means for the calcification of the laminated and also of the lacunal tissue, and also for the absorption, and ultimately formation of lacunæ of Howship where this had happened. After the fibrillation and organization of the effused plastic exudation, the pulp itself commenced to calcify in the ordinary way, its odontoblast layer determining the number and form of its tube systems. That this was the case is indicated by the fact that, though the area is larger, there are not more tubes, but only larger interspaces between the tubes, on its expanded portion, and so far as it goes points to there being neither a fresh formation nor multiplication of the odontoblasts. They were stretched apart, and so in the stretched portion the tubes are far apart, becoming dense in the more expanded portion. Thus, so far as it goes, it is a strong confirmation of the view that a dentine tube is a consequence of the presence of an odontoblast. The fragments of dentine, with the exception of a few small pieces which were driven in more deeply, lay on the surface of the pulp, and were stuck to it by the plastic exudation. Hence the dentinal tubes commence under them (with trivial exception), and mark the limits of pulp tissue and of exudation tissue.—*Odontological Society of Great Britain.*

Reports of Society Meetings.

AMERICAN ACADEMY OF DENTAL SCIENCE.

THE regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Wednesday evening, March 4, at six o'clock, President Andrews in the chair.

President Andrews.—Gentlemen, the Academy is extremely fortunate this evening in having as our essayist one who I am sure you will all be very glad to hear. It gives me great pleasure to introduce to you Frederic C. Cobb, M.D., of Boston, whose subject

is "Empyema of the Antrum of Highmore," with exhibition and illustration of cases by Voltolini's method.

(For Dr. Cobb's paper, see page 405.)

DISCUSSION.

Dr. Cobb.—This method of transillumination is nothing new. The only interest which I claim for it is the fact that it has not been publicly shown on any patients in Boston. It was gotten up by Voltolini a good many years ago, and like most new things was at first overpraised and then again undervalued, and more or less lost sight of. In the cases in which I have used it, in both hospital and private practice, it has shown in almost all instances very satisfactory results.

It is not to be accepted as a conclusive argument for the existence of antrum disease, but simply as one sign which, in combination with other symptoms, helps to make our diagnosis more accurate.

(The lights in the room were then turned out, and the essayist presented several subjects, placing in the mouth of each a tiny electric light, which transilluminated the face, the presence of disease being indicated by dark lines extending to the eye, sometimes on one side and in other cases on the opposite.)

President Andrews.—Gentlemen, this most interesting subject is before you. I am sure the essayist will be glad to answer any questions that any of the members may wish to ask, and I am in hopes the subject will be fully discussed by the members present.

Dr. Wilson.—The speaker referred to some old cases of antrum disease at the Massachusetts General Hospital, of which he said there was no record. I would like to ask about how old the records of those cases were?

Dr. Cobb.—The oldest case I could find mentioned was about twenty years ago. I did not mean to say that there was no record. What I meant was that the record was not so complete as I desired. I could not look up the patients themselves, who had probably wandered all over the country, so that I did not know how long their treatment lasted. If I could have talked with some of them, and learned how quickly their discharge ceased, that might have been valuable information. But in these hospital cases it is almost impossible to find the patients; they migrate all over the world and leave no address anywhere.

Dr. Potter.—Will Dr. Cobb please tell us what the distance is between the opening of the frontal sinus and the opening of the antrum?

Dr. Cobb.—The frontal sinus and the anterior ethmoidal and the antrum all drain into the infundibulum below the middle turbinate. If there is an obstruction to the outflow through the nares, the pus from any disease of the frontal or ethmoidal sinus is very likely to be forced into the antrum. If the middle turbinate is swollen,—and it often is swollen when there is a disease in any of these cavities,—the pus can run down into the antral opening and then down into the antrum. The distance between these openings varies. I should say that they average about one-eighth of an inch. The antrum could not easily force its secretions into the frontal sinus, but the frontal sinus can drain into the antrum.

Dr. Smith.—In the successful treating of these cases, is it always necessary to extract a tooth, providing a tooth is the offender? Or, to put the question in another way, suppose a putrescent pulp in a molar produced disease of the antrum, is it not possible to treat this disease through the roots of the molar? And when the antrum is cured fill the roots of the molar and preserve it in the mouth. Need further trouble in the antrum be expected from the tooth?

Dr. Cobb.—That opens up a very interesting question, and one that my experience does not enable me to decide. I was in hopes I might hear something touching upon that point from the gentlemen present this evening. In the case of the young man who came in this evening, it was very evident that the antral trouble was caused by a tooth, but the tooth was so far gone, and presented such enormous cavities, that it never occurred to me to consider whether it would be wise to do anything else than extract it. I think in all cases reported the procedure of curing any disease of the antrum is usually so long that most surgeons, if they can find a tooth which connects with the antrum, and which has given evidence of unsoundness, usually remove it and treat the antral disease through the tooth-socket. It seems to me that such a tooth might serve as a foreign body in the floor of an antrum, and that it would be wise to remove it. A good stream of water is, I think, imperative in the treatment of these cases.

Dr. Pond.—I would like to mention a case in my practice of antral disease with an opening externally on the face. It undoubtedly resulted from the death of a pulp in a bicuspid, and the tooth was kept because it preserved the opening. After a treatment of about two weeks the antrum healed, and there was no further discharge, and the root was filled, and there has never been any trouble from the case since. The case was treated more than a year ago and quite a large opening was made through the tooth.

Dr. Cobb.—I would like to ask in that case whether there was any discharge of pus through the nose?

Dr. Pond.—There did not seem to be. The discharge and the washing all came through the fistula in the face and the opening through the tooth.

Dr. Cooke.—I would like to ask Dr. Pond how he knows the fistula went into the antrum?

Dr. Pond.—You can easily pass a probe into the antrum.

Dr. Ainsworth.—I would report a case similar to that, only occurring in the first molar. It came into my hands perhaps six months ago. A probe readily entered the antrum through all three roots; there was quite an unusually large-sized opening through each apex and a fistulous opening through the gum draining the antrum. After a thorough cleansing and treatment at two sittings I filled the roots with gutta-percha, the crown with cement, and dismissed the case. Six weeks later the patient returned, when I found the parts perfectly healed.

Dr. Werner.—May I ask Dr. Cobb what antiseptic washes he uses?

Dr. Cobb.—At first I used mild solutions, as Seiler's tablets, Dobell's solution, and various other mild washes. Then I used peroxide of hydrogen, which I found rather irritating in most cases. I commenced at first with a solution of one in three, and then used it stronger, but in most of the cases it seems to irritate too much, even when I used weak solutions. After that I used iodoform in a solution of one in ten diluted with water, simply filling the antrum with it, and leaving it there for a little while, and then washing it out with alkaline solutions. Then I tried europhen, which did not show special merit. I have also tried a very mild corrosive, one in thirty thousand. I do not think it makes very much difference what we use in all these cases as far as the cure of the disease is concerned. I think there is some cause beyond all this that must be reached,—some foreign body, necroses of bone,—something that is not amenable to simply antiseptic washing. My experience with this trouble has been rather discouraging so far as the results from these antiseptic washes are concerned.

Dr. Werner.—Did you ever use glycothymoline?

Dr. Cobb.—Not in such cases.

Dr. Ainsworth.—I would like to ask Dr. Cobb if the operation of curetting the antrum is usually a painful one without the use of cocaine?

Dr. Cobb.—The only case in which I have had an opportunity to curette from the bottom up was in the case of one of the women here to-night, and in that case there seems to be no trouble anywhere but in the antrum. The curetting caused quite a little pain, but not so much but that she would be perfectly willing to have it done over again if I thought it would do any good. I put on quite a little pressure,—as much as I thought it was safe to use. She had, I am sure, some bare bone in the antrum.

Dr. Ainsworth.—I have in mind a case of curetting of a year and a half's duration. There seemed to be necrosed or bare bone over the bicuspids. I suspected possible trouble from a pulpless tooth. I could not, however, bring myself to believe that this was the cause, because the tooth had been well treated and had given no trouble after it was filled, and there was some distance between the apex of the root and the floor of the antrum, yet there was great sensitiveness when the curette was passed over that portion. Later this case cured readily after the burring out of the anterior ethmoid cells.

Dr. Cobb.—Did you see the case after it was burred out?

Dr. Ainsworth.—Not to make a critical examination of it. It seems to be permanently cured, however. I would add that in this case the patient became so despondent and discouraged at the slow progress made towards a cure that he was almost driven to suicide.

Dr. Brackett.—I have been very much impressed by the demonstrations that have been made before us here to-night, and I feel very grateful to the essayist for showing them. They seem to be very practical and helpful, and the subject has been placed before us in such a manner that we shall not readily forget what we have seen and heard.

It is impressive to think how much of pathology is demonstrated not only to be possible, but to be actually existing in this nasal region, in the group of tissues in the neighborhood which the essayist has mentioned in his paper, and the not remote region where adenoid growths flourish. It is impressive to think how much has been learned in recent years of all this comparatively new field of pathology, and also how much has been learned of the possible practical surgery and therapeutics for the very great benefit of patients who have been thus afflicted.

My experience with antral cases has given general corroboration to the statement of Dr. Garretson that a very material proportion of these cases appear to be dependent for their causation upon

tooth-troubles. I have found a very large part of them to be dependent upon such tooth causation that to undertake the salvation of the tooth would be to incur the risk of imperfect treatment and consequent continuance of the antral disease. I have felt that the possibilities of harm to the patient in attempting to retain the tooth far out-balanced the possible future value of the tooth, and quite a share of the cases that I have seen yielded readily to removal of the causative influence in connection with the tooth. Some have not thus readily yielded and have required treatment for a long time.

I wish to speak of the fountain syringe at an elevation as a positively efficient means of flushing that I have used in one of these antral cases. In the treatment of this case Dr. Beverly Robinson, of New York, was with me. After the extraction of the molar tooth, which was the occasion of the antral trouble, we used this very thorough flushing, employing various forms of medication without getting full response until we came upon one which did seem to be followed by gratifying results,—namely, a teaspoonful of the tincture of iodine to the pint of tepid water. I think there is danger in these cases of over-medication; but if thorough washing out is indicated this is a means for its accomplishment.

Dr. Eames.—I am moved to speak from what has been said by the last speaker in regard to his cases generally proceeding from the teeth. My experience has been quite the reverse. In the first fifteen years of dental practice I never saw an antral case; but within the last six years, having had an opportunity to see patients who came to dispensaries, I have seen a number of them. Those that have been in my hands have, in the majority of cases, proceeded from the nose. I have read all authorities in regard to this disease, and I think Dr. Cobb will agree that those who believe that the cause most frequently proceeds from the teeth, and those who think that the origin of most cases can be found in the nose are equally divided. Those who have to deal with dental troubles think that the majority of antral troubles come from the teeth, while rhinologists claim that they come from the nose in the majority of cases.

In answer to the question raised by Dr. Smith, I can see how antral disease of short standing, brought about by the discharge of pus into the antrum from an abscessed tooth, might be cured by treatment through that tooth, which could then be filled and allowed to remain, but it strikes me that a majority of the cases could not be treated in that way. When we find so many antral cases that resist treatment for months and years, when there are

34

one or more large openings into the antrum, we feel that such cases could not be successfully treated through the tooth alone.

I believe the ideal treatment is one in which two openings are practicable.

Referring again to the question of the origin of these antral troubles. I would like to cite one case which shows the possibility of error in diagnosing the teeth as the cause. The history of the case, briefly, is this: The symptoms were given by the patient, and a physician who saw the case diagnosed "ulcerated teeth," and lanced the gum. This not showing the desired effect, it finally resulted in the extraction of the teeth involved, followed by the ordinary treatment for antral trouble through the alveolar openings thus made. The case not getting well, was put into my hands, and on examination of the nose I found what seemed to be a polypus, and I took a fine wire and snared away several pieces of it. On looking at the pieces removed, they appeared to be more fibrous in character, not true polypus; and subjecting it to a microscopical examination, it was found to be a round-cell sarcoma, which extended from the nose down into the antrum, nearly filling it. After enlarging the opening made by the extracted teeth, I took my adenoid forceps, and was enabled to grasp masses of the growth, and remove it with very much less pain and less hemorrhage than by the ordinary process of curetting. These masses that came away would seem to show that the disease perhaps originated by an ordinary polypus in the nose.

Dr. Smith.—In neglected disease of the antrum will the essayist please tell us to what extent the disease involves contiguous tissue and to what complications follow?

Dr. Cobb.—I have seen cases which have lasted for many years. I think they are shown by fouler smell and more discharge; but that is about the only sign that I have noticed. I have not seen any very extensive necroses of the alveolar process resulting from long suppuration. My cases, as I say, have not been numerous enough, perhaps, to found any statement as to what the effect of long-continued neglect may be.

Simple empyema does not seem to extend beyond the limits of the antrum. Many of these cases report that they do not get much worse; they seem to keep along just about the same month after month.

Dr. Taft.—I would like to ask Dr. Cobb if there is not a possible correspondence between a chronic continuance of this disease and a chronic continuance of nasal catarrh?

Dr. Cobb.—No correspondence that I know of, excepting that they are serious as affecting the general health. Now, in the first one of these cases shown here to-night the woman weighed only one hundred and nineteen pounds when she came into the hospital for treatment. She was treated for empyema without any show of improvement at first, and it was a question whether she was progressively going down hill or not. Careful examination showed that there was no sign of malignancy in the case, and after a time she began to gain flesh and strength rapidly; she has now gained eleven pounds. So that keeping the antrum clear certainly has an effect upon the patient's general health.

Dr. Smith.—In regard to the treating of the antrum through the roots of teeth and saving the teeth, I have in mind one case where this treatment was not successful. My associate, Dr. Payne, asked my advice one day in regard to a case of antral disease caused by a first molar that was not only pulpless but thoroughly dead; and he wanted to know if it was not possible to cure the disease and save the tooth. I advised him to extract the tooth, but he decided to attempt the treatment of the antral disease through the tooth. He tried it a while, and gave it up; then he extracted the tooth. I have forgotten to ask him how much he treated it, or how persistent it was, and I will therefore ask him now how long it took to cure that case.

Dr. Payne.—The patient presented after having an opening drilled through the process to relieve an abscess that was forming. This drilling, by mistake, was carried to the antrum, and a syringeful of strong creosote was injected; but the effects of that were not apparent when the case came into my hands. She came to me with considerable trouble in this pulpless first molar, with a discharge of pus from the nose. The fistula, in the mean time, had closed. I removed the filling in the tooth, and found dressing in the roots, which I removed; enlarged the opening through the end of the palatal tooth, and washed out the antrum with a very weak solution of carbolic acid and water, perhaps one to two hundred and fifty or three hundred. The patient went away, and when I next saw her found that the pus had discharged through the palatal root and also through the nose. I continued this treatment through the root until the pus discharge had ceased. A dressing was put in the canals, and the cavity in the tooth stopped up, and the case went along for about four months with no trouble at all. She came in one day complaining of a severe pain in the affected region, and stating that she had had a severe cold, which

caused a return of symptoms, and pus was again discharging through the nose. I removed the dressing, washed out the antrum, and found that the canals could not be stopped up without causing pain; and, as the patient so desired, I had the tooth extracted, washed out the sockets and antrum with a weak solution of carbolic acid, and it immediately healed.

Dr. Smith.—I would like to ask Dr. Cobb if he has used carbolic acid in any form for washing out the antrum?

Dr. Cobb.—I have not.

Dr. Smith.—I saw it recommended years ago for this purpose, and I still consider it a good remedy.

Dr. Cobb.—How strong do you use it?

Dr. Smith.—About one in two hundred and fifty to three hundred.

Dr. Cobb.—In washing the antrum we always have to consider the irritation of anything passing over the nasal mucous membrane. Dr. Payne spoke of the patient in his case having a cold, and thus starting up her antrum again. I have heard a good many patients complain of just that thing, but, if you will look into it, you will often find that it was not a cold which started up the antrum, but the antrum which caused the "stuffed up" feeling which the patient supposed to be a cold. If you cross-question them, you will find that their cold was simply one-sided, while the other side is absolutely clear, and the discharge is simply antral pus. That fact I did not discover for some little time, so that it is always advisable to find out whether a patient's definition of a cold is really a bilateral stoppage followed by simple mucous discharge, or a unilateral flow of offensive-smelling pus, sometimes not even preceded by any stopping.

Dr. Banfield.—When the disease was cured, you would expect these openings made into the antrum to close of themselves?

Dr. Cobb.—The artificial openings? Yes, they heal so quickly that one can hardly keep them open. Behind the vestibule in the nose the nasal secretion is very antiseptic, so they have the very best possible chance of healing.

Dr. Taft.—I would like to know how the essayist would diagnose a case of empyema,—that is, to distinguish it from a case of chronic nasal catarrh?

Dr. Cobb.—There are other forms of discharge that are offensive besides empyema. One is ozæna, which is accompanied by dry crusts and scabs, very shrunken turbinates, and dry-looking mucous membrane. You may have a rather wide nose in the case

of empyema, but you do not have that dry, trophic look that you have in ozæna. The only other nasal discharge that has an offensive smell is that of syphilis, and that you can often tell by necrosed bone in the septum itself. If there is ulceration of the turbinate, you can always suspect syphilis with a good deal of probability. Of course, I am simply referring to the antrum; the other cavities have to be considered in your examination. The ethmoid will also produce a bad-smelling pus, but, in my experience, not nearly so bad as the antrum.

Dr. Taft.—One feature of the diagnosis would be that in empyema the odor of the discharge is evident to the patient; in chronic nasal catarrh the odor is not perceptible to the patient.

Dr. Brackett.—I move a cordial expression of thanks to the gentleman who has read the paper, and given us these most interesting demonstrations and diagnoses.

Unanimously carried.

William H. Potter, D.M.D.,
Editor American Academy Dental Science.

ACADEMY OF STOMATOLOGY.

The regular monthly meeting of the Academy of Stomatology was held Tuesday, April 28, 1896. President Dr. S. H. Guilford in the chair.

After the transaction of routine business, the secretary read the proposed changes in the constitution and by-laws; the discussion upon these changes had previously occupied the time of a special meeting called for the purpose. The matter was therefore very briefly considered at this meeting.

Dr. Thomas called attention to the fact that this society had made no contribution to the Horace Wells Memorial fund, although contributions had been received from all over the country, except Chicago, New York, and Philadelphia. It had been left until the last to appeal to Philadelphians, with the hope of securing the largest contribution.

The doctor called attention to the fact that at the next meeting contributions would be asked for that fund. The way other societies had done was by the society contributing what it could, and then the individual members giving what they felt able to give. The speaker said he hoped there would be a large attendance at the next meeting, and that the contributions would be liberal.

Dr. W. L. Mason, of Red Bank, New Jersey, then read a paper on "A System of Detachable Facings."

(For Dr. Mason's paper, see page 488.)

DISCUSSION.

Dr. Register.—As I understand Dr. Mason's paper, it strikes me as being quite ingenious. I have given considerable attention to bridge-work, probably being one of the first in Philadelphia to have inserted this kind of work. Some of this is doing service to-day, inserted fifteen years since. I restored a piece not more than ten days ago that had been in use for sixteen years without removal. A number of years ago I was interested in making a crown that was detachable. I made several bridges in which the bridges were placed in position first, and the crowns were put on after the pieces were placed in the mouth. A number of the bridges did quite good service. My method of making the crown was almost opposite to that of Dr. Mason's. Where he makes the dovetail on the posterior in the centre of the crown, I made it on the edges of the crown, and made a septa between each tooth, so that when the work was all finished and soldered together, the crowns were slipped into place with phosphate of zinc.

The objection that I had to that style of bridge was that the division, where it came in between the teeth, was apt to show in the front part of the mouth, and was unsightly. I could not entirely cover that up so as to give a natural appearance to the teeth, so I discarded it. After the all-gold crown came into use, I abandoned the porcelain altogether in all my bridge-work, and used all-gold crowns and dummies, and filled in with vulcanite, so that it is perfectly secure, and nothing but a liquid can get under the dummies. In all these cases there is not an instance I can recall where the patient complained of any disagreeable results. In front teeth I think Dr. Mason's method may be a great improvement.

Dr. Burchard.—This subject impresses me as having decided value. Like every method it has its important side, its advantages and disadvantages. What those advantages and disadvantages are, it will take time to discover, but it is decidedly a method worthy of trial. But it seems to me there would be some difficulty in close-bite cases or near-bite cases. Do you find that to be so?

Dr. Mason.—No, the troubles you would meet with are more under control than in the old-time bridge.

Dr. Burchard.—I must confess I never had any of the trouble in checking porcelain mentioned in the paper, and I would be very

sorry to see that branch of technology driven out of existence on account of the lack of skill in using solder. It can be used safely, but for those who have or have not the skill, I think Dr. Mason's method would be of great service.

Dr. Broomell.—I would like to demonstrate, if I can, a method I have employed. It is probably, from what Dr. Register says, somewhat similar to the one he adopted some years ago. The dovetail, which I have used in rare cases, is made entirely of metal. I happened to find a tooth in my laboratory to-night with the dovetail in place on the tooth, which I will pass around. I place the back in position first. I make a wedge-shaped dovetail, in this manner. (Indicating on black-board.) This, of course, is a side view; looking on the end of the tooth you have this appearance, that being the labial surface of the tooth, this being the back. (The doctor further illustrates his method by the board.)

The essayist spoke of trouble in checking teeth. I never give that matter any thought, because it seems to me nearly always to be a difficulty that can be overcome.

He also spoke of throwing in borax. I think that is one of the greatest mistakes that can be made. I suppose he means by that that he uses dry borax. That, I think, is what does the damage. The smaller particles of borax will settle down on the investment, whereas, if you use it wet and touch it just where you want the solder to flow, you will overcome any danger of checking.

Another great cause of cracking, I think, is drawing the pins together after the backing is in position. If they are drawn very firmly, it produces a strain, pulling on the porcelain at that point, causing checking from that extra strain put on it by closing these pins together. To overcome this, I think it is policy to barely bend them down sufficiently to keep the back in position, while you apply the solder and heat the piece.

Dr. Burchard.—The matter of checking porcelain may not be exactly pertinent to the question, but there is one method that with ordinary care soldering may be almost invariably successful. Porcelain, gold, and solder all have different indexes of contraction. If there is a great amount of solder placed behind the porcelain, in cooling, the porcelain must give way.

(The doctor, then, by illustrations on the black-board, illustrated his method of doing the work.)

Dr. Kirk.—I have here a piece of work which is an attempt at removable porcelains, by Dr. M. C. Marshall, I think, of Alabama, presented at the Southern Dental Association, and it may have

some features of interest. A box is formed in which this porcelain fits, and the box is then soldered together sufficiently to penetrate between the proximal surface and overlap the buccal surface to make them retentive, and they are then cemented in place.

The device is interesting as one of the methods of securing detachable porcelain, but it seems to me to have an objection in showing a considerable amount of gold. I will pass it around for inspection. This is simply an experimental piece. They are cemented in before the piece is mounted.

Dr. Mason.—There seems to be a wrong conception of the dovetail on the back of the tooth. In my paper I said it was not necessary to go into the detailed construction of the tooth, as the teeth would be manufactured for the dentist. I understand some of the gentlemen have an idea that the dovetail is porcelain. It is pure platinum.

Dr. Truman.—I would suggest to the essayist that he would do well to alter that part in his paper. It struck me at the time he was reading it that it was not clear. I inferred it was porcelain and wondered how he could saw it off.

Dr. Guilford.—Have you made arrangements to manufacture them?

Dr. Mason.—I have made very favorable arrangements. I have connected myself with a gentleman very much interested in it, and expect to manufacture the teeth provided we can get the porcelains, and I think we are in a fair way to secure these.

Dr. Guilford.—Will each porcelain have a platinum back.

Dr. Mason.—The dentist will buy the porcelain with the dovetail soldered in position, also with its back. If you buy a tooth, mould No. 22 to-day, six months from now you can buy a duplicate tooth, lateral, central, or canine.

Dr. Guilford.—Do I understand you to say you set them in chloro-percha instead of phosphate of zinc?

Dr. Mason.—You can set them in phosphate of zinc if you so choose, but if the porcelain should break off you will have a little more trouble in dislodging the dovetail from its back than where chloro-percha is used. Chloro-percha is firm enough.

The subject was then passed, a vote of thanks being extended to the essayist.

Dr. Jack presented a resolution extending a vote of thanks to Dr. Crouse for his work. After reading the resolution it was unanimously adopted.

Dr. William Truman exhibited to the society a number of books

on dentistry, dating from a work written in 1583, in Latin, and extending to an English work in 1839.

The works were submitted for the inspection of the members.

The meeting then adjourned.

A meeting of the Academy of Stomatology was held June 23, 1896, at the rooms of the society, for the purpose of discussing the report of the special committee on dental nomenclature of the American Dental Association, the president, Dr. James Truman, in the chair.

Dr. Guilford, the chairman of the committee, had at the May meeting distributed copies of the report to the members of the Academy, in order that searching criticism and comment be made upon the results of the committee's work.

DISCUSSION.

Dr. Guilford.—An immense amount of labor has been expended upon this report, and it is by no means in a state of completion. The subject is open to searching criticism by the dental societies here and elsewhere, and by the profession at large. It is hoped through such a general interest we may place our nomenclature upon a sound and rational basis.

I desire to comment briefly upon a few of the features of the report, as it exhibits findings which are at variance with our common views, particularly as relates with the pronunciations of words.

You will notice, first, that the word abnormity is given preferance over abnormality; it is shorter.

The distinction between absorption and resorption is sharply drawn. These words are frequently employed as synonymes, but they are not synonymes. The accent in the word alloy is placed upon the last syllable. Aluminum replaces aluminium. In the word anæsthetic the diphthong *æ* has substituted for it the vowel *e*.

You will notice the plural of apex, which has its accent upon the *a*, is apices, the first syllable being *ap*,—ap'icēs.

Proximate and proximal are preferred to approximate and approximal; the words are then stems upon which any prefixes may be grafted.

The meeting of the masticating surfaces of the upper and lower

teeth is frequently spoken of as an articulation; it is more accurately described by the word occlusion.

You will notice that in the word bifurcated the accent is placed upon the second, not the first, syllable.

The words calcareous and calcific are frequently used interchangeably: this is an error. A calcareous substance is one formed of lime; a calcific body is one which forms lime.

A great deal of confusion surrounds the two terms cast and model. Some years ago I inquired of the son of Hiram Powers, the sculptor, the son being a student at the Philadelphia Dental College at the time, what is the distinction sculptors draw between a cast and a model. He answered that a model was something which was copied; a cast was a body formed in a mould. An arbitrary distinction has been suggested, so far as dentistry is concerned, by making model to serve as the title for a plaster cast which is to be reproduced in metal; cast to be applied to the plaster not so reproduced. The distinction is not fully accepted; the practice of calling all plaster casts models appears to be more acceptable.

Of the two pronunciations of cement, cement′ is preferred to cem′ent.

In gutta-percha no reason appears for the *ka* sound in termination; the *ja* is preferred.

Contour is pronounced contour′, not con′tour.

Cor′onal is correct, coro′nal incorrect.

The majority of dictionaries give the preference to dentin over dentine.

In fora′men the accent is upon the *a*′, not upon the *am*′.

The spelling gage has generally displaced gauge.

In the word gingivæ you will note the accent upon a long *i;* it is gin-jī-væ, not gin-givæ.

The word lever is pronounced lev′er, not le′ver.

The singular of matrix is ma′trix, the plural mat′rices.

Pericementum should be the term employed instead of periosteum.

Sixth- and twelfth-year molars are solecisms.

The word solder is omitted from the list; it is to be pronounced sod-der.

Tartar is a word of doubtful origin; it probably arises from the resemblance which the deposits upon teeth bear to the incrustations upon wine-casks.

The words vulcanite and rubber, often used as synonymes, should be each distinguished. Rubber, a soft body of certain com-

position; vulcanite, a hard body, of a different chemical composition.

The word obturator is restricted to appliances which cover an opening in the hard palate.

A velum is an appliance designed to remedy a deficiency of the soft palate.

The terms sweating and autogenous soldering appear to be unsatisfactory.

Dr. Burchard.—In pursuance of Dr. Guilford's suggestion, made at our last meeting, I have examined the dictionary list prepared by the committee of the American Dental Association, and have marked certain parts which I think will bear close discussion. Most of these matters relate to the subject of definitions. It is right and proper that we should dwell upon this matter, for exact definitions are things of no little importance. I am a firm believer in precision, not only as to the application of words, but also to their definitions. Our technical words each should have an individual meaning. Even words which are usually regarded as synonymes may be but partial synonymes; in fact, they usually are, for it is rare that any word has precisely the same meaning as another. These shades of distinction are of importance, particularly from a literary point of view, and it behooves us to make the differentiations precise and clear.

You will notice in the list that the word abnormality is defined as the state or quality of being abnormal; irregularity, deformity, malformation. The word is given as a noun, and you will see that the definition implies, in part, an adjective. Instead of the definition given, it is suggested that one founded upon the etymology of the word would be more precise and explanatory: *An abnormality is an abnormal thing, not state. "It is a variation from a general typal form."*

The next word marked is air-chamber. This is a misnomer; what is defined as an air-chamber is a vacuum-chamber.

It is given as a definition of alloys that they are compounds of metals produced by fusion. This is inexact; *they are compounds formed when the metals are in a state of fusion.* In the verb definition of the same word, to alloy, to reduce the purity of or otherwise modify metals by admixtures, the words *with other metals* should be appended. For the purity of a metal may be reduced without forming an alloy; for instance, the purity of silver is reduced by admixture with sulphur, oxygen, chlorine, bromine, and so on, and yet such compounds, it is needless to state, are not alloys.

The words analgesia and analgesics are omitted. I think a distinction should be drawn between anæsthesia and analgesia. As a rule, we find these words used as synonymes. Anæsthesia is a word which was coined by Dr. Oliver Wendell Holmes to designate the state of insensibility produced through the inhalation of ether or chloroform. It refers to a general abolition of sensation. Analgesia, denotes explicitly an absence of pain; analgesics would therefore include anodynes and obtundents. The root *æsthesis* refers to psychical perceptions,—that is, sensation in the sense that the mind perceives,—therefore the title anæsthetics should be applied to agents which produce general unconsciousness; analgesics to those which destroy sensation, and do not affect general consciousness.

Dr. Roberts.—You imply, therefore, that local anæsthetics are analgesics.

Dr. Burchard.—Yes; they produce a condition of analgesia, not anæsthesia, as the state described by Dr. Holmes is understood.

For the word anomalous we find the definition: "Deviating from that which is natural." This defines an abnormality, not an anomaly. A definition, to be in consonance with the etymology of the word, should state, "Deviating widely from that which is natural." The same adverb should be inserted in the definition of anomaly.

The word antiodontalgic impresses me as a specimen of needless word-coining.

The definition of asepsis is unsatisfactory and not precise. It states, "Absence of blood-poisoning, exemption from putrefaction and its consequences." The word sepsis should be substituted for putrefactive. These words are not mutually synonymous. Putrefaction always implies sepsis, but sepsis may or may not be due to putrefaction. A comprehensive definition would be, "Asepsis is an absence of those substances the absorption of which causes the condition of septicæmia."

In the definition of antiseptics, septic should be substituted for putrefactive.

In the definition of atavism, the word recurrence is used instead of the usual one, reversion, and it is perhaps better, as it is more precise.

In the definition of the word atrophy, it says, "A gradual wasting of the body." It would be more embracive to say, "A wasting of *a tissue, an organ, or the body*," for atrophy of a single part is very common.

No dental application is implied of the word automatic, and there is no reference to so-called automatic mechanism.

For the definition of asphyxia, the following is submitted, in lieu of that given in the pamphlet: "Asphyxia is a suspension of vital phenomena due to a cessation of normal respiration."

In the definition of calcareous, it is given, "Composed of or containing lime." Calcium salts should be substituted for lime. When we say lime we mean the oxide of calcium; calcareous may or may not refer to the oxide; in fact, it rarely does when used in connection with physiology or pathology.

In the definition of cast, the word matrix should be substituted for mould. A mould is something produced through the operation of moulding; our casts are made in forms which may or may not be moulded, but they are always formed in a matrix.

It is unquestionably correct to say gutta-per-cha, not perka. The former is in consonance with the etymology of the word. The Malay word pertja has been Anglicized into percha.

The word dentalgia is a useless hybrid of Latin and Greek; the word odontalgia, derived from two Greek roots, is certainly preferable.

In defining epithelium, it is spoken of as a "very delicate membrane." This is misleading, for, in point of fact, epithelium represents resistance. Modified epithelial tissue is the most resistant of all tissues. The "very delicate" should be omitted. The following definition is suggested: "Epithelium,—the external cells covering the surface of the body, lining mucous passages and glands."

Dr. Cryer.—How about the epithelium of internal structures?

Dr. Burchard.—It is a modified epithelium, called endothelium, which lines blood-vessels, the mesentery, etc., parts which are subjected to continuous friction.

In the definition of hypercementosis, precision would suggest a substitution of prepositions. Hypercementosis is exostosis upon, not of, the cementum of the teeth.

Dr. Truman.—Why do you draw that distinction?

Dr. Burchard.—Because the cementum itself is not the active agent of production. The pericementum deposits cementum upon the existing cementum. The word odontitis is an impossibility; we cannot have inflammation of all parts of a tooth.

Dr. Cryer.—Why not?

Dr. Burchard.—Unless you subscribe to Dr. Frank Abbot's views as to vital processes in enamel,—and I don't believe you do,—

that tissue and, as we no doubt all believe, the dentine must also be excluded from participation in the inflammatory process.

Dr. Cryer.—We say odontalgia in referring to toothache; why not odontitis in connection with dental inflammation?

Dr. Burchard.—I think it is a difference of grammatical case, *itis* referring to the genitive case; it is "of." *Algia*, an ablative suffix, in this connection would mean "in."

Odontoblasts are defined as "the cells which are active in the formation of dentine." Many other cells are also active. The odontoblasts are the cells through which the dentine is formed.

Odontoma is spoken of as "a tumor composed of dentine." Although they do contain dentine, they may also, and usually do, contain other dental tissue, enamel, and cementum.

The peridentium is defined as "the periosteum." The words "of a tooth" should be added, and, even then, why have the word at all? Pericementum denotes explicitly what the peridentium, as here defined, is; besides, the peridentium really is the pericementum and the alveolar process. The word periodontium (not given in the list) is open to the same objection.

Dr. Guilford deplores that the word root, which appears to have no demonstrable logical origin, should be retained. I would suggest one explanation to this matter. First, the root of a tooth is that part implanted in process, and transmits the sources of nutrition. Again, if you recall the appearance of a developing tooth and the process of dentition, its growth is outwardly a resemblance to that of a plant. A root extends downward, the crown comes upward, like the descending and ascending portions of a germinating seed.

Stratum granulosum has a definition which would imply that it is the membrana propria of Garretson. The stratum granulosum is an histological appearance in that portion of the dentine immediately underlying the enamel and cementum.

In the definition of vacuum-chamber, it is stated, "A space entirely devoid of matter." No space can be entirely devoid of matter; the word, as applied, means a space devoid of air.

The word spelt ferrule is advised to be pronounced feril. This seemed so incongruous that I looked up the etymology of the word. It is traced, first, to its French source, *virole*, meaning an iron ring. This is in turn from the middle Latin of *viriola*, a little circlet; it is a derivative of *ferrum*, iron, which is also the etymological source of ferrel. You will notice that the *oo* or the *l* sound is present, but not any sound from which feril could be de-

rived; so that, according to etymology, the pronunciation should be fer-rool or fer-rel.

Dr. Guilford.—Nevertheless, the majority of lexicographers give the *il* sound.

Dr. Burchard.—Despite that, it is not in accordance with the word's etymology, and, in the absence of recognized rules or reason, why not take the only one available?

In works and discussions upon dentistry, the terms prosthetic and mechanical dentistry are used as mutually synonymous. It appears to me that a distinction should be drawn between them.

Prosthetic dentistry includes the planning, devising, and construction of apparatus designed for the replacement of lost dental parts. Mechanical dentistry includes the technical operations through which these appliances are constructed. Prosthetic dentistry, the architect's side; mechanical dentistry relates solely with laboratory technology. Mechanical dentistry is included in the prosthetic, and is but part of it.

The word tartar is commonly believed to have its origin in tartarus, the Greek for hell. The exact significance of the word as applied to wine-cask tartar is given by Paracelsus as follows: the destruction of tartar gives rise to acrid and irritating substances.

Dr. W. H. Trueman.—We need only to examine the pamphlet closely to see the amount of painstaking work represented in it. I think the profession at large should be grateful and appreciative to this committee, not only for what they have done, but how they have done it.

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

A REGULAR meeting of the Association was held on Monday evening, March 16, 1896, in the parlors of Mr. Simon Davis, Broad Street, Newark, the President, Dr. Walter Woolsey, in the chair.

Present, the following members: Drs. Adams, Adelberg, Barlow, Brown, Crater, Fish, Gregory, Holbrook, Hoblitzell, Hardy, Hane, Hindle, Iredell, Linstead, Meeker, Riley, Rosenthal, Stevens, Sutphen, Wilson, Woolsey.

The minutes of the last meeting and of the annual meeting were read and approved.

The following-named gentlemen were proposed for membership, and the proposals referred to the Executive Committee: K. B. Osmun, of Summit, sponsors Dr. F. C. Barlow and Dr. C. A. Meeker; Julius Peters, of Jersey City, sponsors Dr. C. A. Meeker and Dr. C. W. Hoblitzell; William B. Martin, of Elizabeth, sponsors Dr. Oscar Adelberg and Dr. G. Carleton Brown.

Dr. Meeker read communications from Dr. F. A. Shotwell, of Rogersville, Tenn., and Mr. D. W. Craig, of New York.

Dr. Meeker.—Mr. President, I have before me the stenographer's report of the toasts and responses at our annual dinner. The response of Dr. Jack is one of the best expositions of the results of the work of the Boards of Examiners in the United States that I have ever read. The response of Mr. Guy, the editor of the *Electrical Review*, is also of more value than any reports that I have read in the magazines that are devoted to electrical science; and I move you, Mr. President and members of the society, that this report be printed in pamphlet form for circulation among our members and the gentlemen who responded to the toasts.

The motion to print was carried.

The President.—Gentlemen, we will now listen to the paper of the evening. I have the pleasure of introducing Wendell C. Phillips, M.D., of New York, who will make some remarks upon "The Principles and Applications of Cataphoresis."

(For Dr. Phillips's paper, see page 418.)

The President then called upon Dr. Hodson to open the discussion.

DISCUSSION.

Dr. Hodson.—Mr. President and gentlemen, I have nothing more to say than that I have seen the effects of cataphoresis upon patients, and the effect has seemed wonderful to me. I myself do not use it, and I can speak somewhat as an outsider. I saw the operation upon Dr. Cady, I think it was, where the application of a cold remedy on cotton was crucifying to him, yet after some minutes of the application by Dr. Gillett, under rather unfortunate circumstances, indeed, the effect was really magical. I have seen other operations done in the same way and with the same effects, and it seems to me that not only cataphoresis but this volt-selector for its application are a success.

The President.—Dr. Evans, have you something to say on this subject?

Dr. W. G. Evans.—In connection with cataphoresis I have really had a large experience, having had the privilege of being

with the men who did the first and probably the last work that has been done in that direction. The present outlook is good, and I may say that the best promise of the near future in dental work is in the sterilization of decayed roots with solutions of pyrozone. That will, in all probability, be made a very practical thing as a consequence of the introduction of cataphoresis and the fractional volt-selector. I may also say that here to-night I have received a suggestion which is of great importance, and that is that a combination of arsenous acid and cocaine may be driven into the living pulp, not only to obtund the sensitiveness of the shrinking nerves, but also to permit you to assume the responsibility either of extirpating the pulp or of having it die without pain. It seems to me that really there is something of very great importance in that suggestion.

The question of uric acid is one that we are likely to get some light on from the essayist. I would like to ask Dr. Phillips if he has, in the treatment of the throat, made any observations other than those he has mentioned to-night with regard to the condition of the teeth in patients with gouty manifestations of the breathing passages?

Some of the best writers now claim that uric acid is to be credited with many of the pathological conditions of the teeth, and it seems to me that Dr. Phillips might give us valuable information about the throat and nose in that connection. I make this suggestion because I think he is in the line of bringing to the front that which you need most in the way of diagnosis.

Dr. Phillips.—With regard to the question raised by Dr. Evans as to gouty diathesis, I cannot say that I have made accurate investigations in the direction of his inquiry, but I shall return home to study the history of the teeth in connection with these things, and in the course of two or three years I will come back to the New Jersey Central Association and give you a report. I am sure that a rheumatic diathesis is often associated with affections of the nose and throat. I have one case of acute tonsillitis that has a rheumatic condition back of it, and I am curing the acute tonsillitis solely by the use of antirheumatic remedies. I think we are in the line of making some discoveries that will bring about good results in the future.

Dr. Phillips made some demonstrations with the electric mouth-lamp.

Dr. Hahne.—Mr. President, I think that I will only express the feeling of all present here when I say that the paper is one of the

best lectures that has been given before our society, and I move a vote of thanks to Dr. Phillips. I also move that he be made an honorary member of our society.

The motion was seconded by Dr. Meeker and carried unanimously.

Adjourned.

A REGULAR meeting of the Association was held on Monday evening, April 20, 1896, in the parlors of Mr. Simon Davis, 943 Broad Street, Newark, after the usual banquet, the President, Dr. Walter Woolsey, in the chair.

The minutes of the last regular meeting were read, and after amendment approved.

The secretary read a paper by Mr. G. H. Guy, editor of the *Electrical Review*, entitled "The Future of Dentistry electrically considered."

(For Mr. Guy's paper, see page 491.)

DISCUSSION.

Dr. Sanger.—Mr. President and Gentlemen,—Your treasurer, in asking me to open the discussion of this paper, exhibited a most deplorable lack of consideration for your feelings.

I never heard of the paper before this evening, and my understanding of its contents is therefore limited to the knowledge I was able to gain of it as it was being read by the secretary. Under these circumstances any adequate discussion of the paper is impossible and an attempt to discuss it is dangerously near the absurd.

The subject is of rapidly increasing importance in medicine and surgery, and no less so in dentistry, which is a part of the science and art of preserving health and healing disease. I will not thereore attempt the impossible, and to avoid the absurd will limit my remarks to a few suggestions as to possibilities in this direction.

Some of us, who had the pleasure of being the guests of the Brooklyn Society not long ago, heard a concise and intelligent discussion of some interesting experiments in using electricity, and especially with regard to cataphoresis.

The thought came to me there that certain well-known psychological laws, acting under these circumstances, might cause some of the results in obtunding sensitive dentine that had been

credited to cataphoresis. The effect of suggestion has been shown again and again in lessening or removing the sensation of pain. And in the present attitude of the average mind towards electricity and its wonderful power, the condition of receptivity of suggestion in connection with electrical appliances is extremely favorable for obtaining the best results. Auto-suggestion will have a free field, and the mental state of the operator will influence results.

The action of the electric current in cataphoresis is more satisfactorily shown, it seems to me, in bleaching teeth. Those who have tried this claim that the bleaching power of electrozone and pyrozone is increased by using with them the electric current.

I am not prepared to say how far this is true, although I have made some interesting experiments in this direction. Not having reached a definite conclusion as yet, I do not wish to make any detailed statement of them.

There are gentlemen here who have followed this subject from the beginning, and I cannot do better than give place to them.

The President.—I will call upon Mr. Evans, of New York, to speak upon this subject.

Mr. W. J. Evans.—Gentlemen, I feel much indebted for the honor which you confer on me on this occasion; but when Dr. Sanger says of me, in connection with others present, that I am one of those who know all about the subject under discussion, it is most embarrassing to me, and I want to deny the allegation at once.

There are many things in connection with this subject which, considered from the stand-point of physics, chemistry, or therapeutics, will give you facts which will yet be a portion of medical history, and which will mark this decade as an important epoch in dental surgery. Cataphoresis is a subject with which I have been familar for some considerable time. In regard to the particular branch of the surgical profession which you practise, Dr. Sanger has very rightly said that cataphoresis can be no bugaboo when we have the bleaching of teeth as a result of its influence.

It will take us some considerable time before we understand all the vagaries that there are in connection with cataphoresis. There are many things maturing hopefully in this connection. Some reference has been made to glycerin in connection with cataphoresis. Glycerin was never intended by Professor Morton to be used in connection with guaia-cocaine and the electric current. What he suggested was that this combination might be applied to the gums. He has now given up entirely the use of glycerin and

crude guaiacol, for the reason that guaiacol as formerly obtained was not a preparation from which the best results could be secured. It did have a certain escharotic effect, and a very decidedly bad odor. Recent experiments in the laboratory of McKesson and Robbins have proved that a compound without odor, equally effective, is possible. Investigations of Professor Prescott and others are now in progress which will give you within a few weeks a very important improvement in guaia-cocaine. In connection with the sterilization of the roots of teeth, it has been proved to be a fact that such sterilizers as pyrozone, and other things of that character, can be driven into a porous structure by the aid of the electric current; and the sterilization of the roots of teeth is a thing which will occupy the attention of some of the very best men in your profession.

I have recently had very great privileges in connection with the X-ray. I have been a great deal with Professor Morton, and I can promise those of you who attend the lecture which he is to give before the New York Odontological Society next Friday a very rare treat; and I think I may ask as many of you as have not received a card of invitation to come to that meeting, because I know, from the character of the men who issue those cards, and the enterprise of the society having this lecture under their auspices, that you will have a hearty welcome. I know they wish to have, and expect, a large number present, for they have taken a large room in the Academy of Medicine instead of the smaller room usually occupied by the Odontological Society. I can assure you that you will be able to see there some magnificent stereopticon views, photographs which will show you not only the skulls of the dead, but of the living as well. You will see on the platform that evening a handsome young gentleman, a dental student, and then you will see exhibited on the same platform, absolutely without any embellishment, his skull; you will see each particular tooth represented; you will see its pulp-chamber, without a filling, represented in lines, which indicate that the centre has less osseous density than the outside of the tooth. You will be able to see radiographs, or scotographs,—referring to darkness and shadow; you will see that shadowgraphs indicate to you any deformity of the roots of the teeth, or any teeth that have not come into position in the arch, or any osseous deformity which may take place in the jaw; and you will be very much surprised to find that, regardless of the fact that bullets can be shown in the body, copper washers placed at the side of the skull will show through the skull and its contents.

They will show you photographs of the whole of the skull, and all of the teeth in it can be perfectly illustrated by the influence of the X-ray on a plate. I only say this to show you that the skull can be penetrated by this ray, and that therefore the X-ray seems to be a very important thing in dentistry. Lost tips of drills will be shown as clearly as you can see the fish-hook in a trout without seeing the artificial fly which the fish has swallowed. You may be able to see any little differences in the osseous structure of the mouth, as well as you can see the most delicate lines of a fish's skeleton. Bullets lodged in the body may be shown by the cathode ray, and I predict that you will be able to see many things in connection with malpractice in dentistry which have not yet been seen. I congratulate you that you are in that department of surgery, because I have already been told by Professor Morton that the X-ray offers really more to the dentist than it does to the general surgeon. I thank you, Mr. President, for calling upon me, and for your kind attention.

The President.—I will ask Mr. Woolf if he cannot give us some idea in regard to the bleaching of teeth by means of electricity.

Mr. A. E. Woolf.—I thank you, Mr. President, for the honor you do me; but, being much devoted to other things in my laboratory, I have not been able to give as much time and attention to the action of electrolysis in the decomposition of organic matter in connection with dentistry as I would have liked to; and, having many very warm friends in the dental profession, I have to acknowledge negligence on my part in the past, but I hope it will be made up in the future. The only thought that I can suggest which might possibly be of interest to you would be the action of electrolysis and the part it plays in dentistry. For example, take a saline solution and apply it to a cavity containing organic or decomposed matter, and apply the electric current, the action would be the decomposition of the electrolite, electrolysis taking place. At the anode or positive pole,—which you would probably insert in the cavity,—in the decomposition of the chloride you would liberate the chlorine from the chloride, and oxygen from the water, both being positive elements. The action of the chlorine would be to combine with the hydrogen of the decomposed matter, leaving the decomposed matter as it existed minus one of its elements. The action of the oxygen would be to oxidize the remaining portion. In the case of peroxide of hydrogen coming in contact with organic matter, decomposition takes place, and one atom of oxygen is liberated. In that case you merely get an

oxidizing action. The action of oxygen plus chlorine would be the more rapid decomposition of the organic matter. With a proper current and a proper electrolite you would have a very rapid decomposition of the coloring matter. I cannot speak from practical experience, I can only speak from theory, and the theory certainly would be that there would be complete decomposition of the coloring matter. I have not gone sufficiently deep into the subject to be able to add much to your information, but I will devote some time to it in my laboratory, and on some future occasion I hope to give you something that possibly may be of interest to you, in this connection. In the mean time allow me to thank you very much for your attention.

The President.—There are some gentlemen present who have had experience with cataphoresis; we would like to hear from them on this subject. Dr. Palmer, I think, can tell us something about it.

Dr. Palmer.—Mr. President, I have had some experience with the use of the electric current, but not to the extent that I am prepared to either read a paper or make any extended remarks upon the subject. On two or three occasions at clinics I have used the Wheeler volt-selector in obtunding sensitive dentine with remarkable results, even better results at clinics than I have had in my own office. Whether that was due to the fact that my friend Evans was present, or because the preparation of cocaine that we used was fresher, I cannot say; but in every case where I have used the electric current in this way it has been very successful. In my experiments on sensitive dentine in my own practice I have been endeavoring to reduce the length of time required to obtain the anæsthetic effect, and I have succeeded in obtaining complete anæsthesia in a much shorter time than has been indicated by Dr. Gillett, of Newport, who is, I presume, the best authority in dental circles on such matters. As to the use of the electric current for bleaching teeth, I would not, I think, in the presence of Dr. Meeker be expected to say very much, but from the experience I have had I think I should support him in anything he might say upon that point.

Dr. Brown.—What is your minimum time for obtaining complete anæsthesia in a buccal cavity?

Dr. Palmer.—Five minutes; in a lower bicuspid, one-third of the crown being denuded from some cause, and the whole grinding surface being particularly sensitive, there being also a cavity in the posterior portion of the tooth which connected with this abraded

surface on the crown. In five minutes time it was so completely anæsthetized that I was able to use the bur without any pain whatever.

Dr. Brown.—What preparation did you use?

Dr. Palmer.—A twenty-per-cent. solution of cocaine.

Dr. Brown.—In what medium?

Dr. Palmer.—A very small dilution; using, of course, the electric current. In most of my experiments I have used a twenty-per-cent. solution of guaia-cocaine, to which Mr. Evans has alluded to-night.

Dr. Brown.—Mr. President, it is certainly an important thing to reduce the time required in the cataphoric obtunding process. I have been working in this direction since the Baltimore meeting, and since I received my machine, and I must say that I believe we will be able to reduce the time so as to make it possible to use cataphoresis in our work. When it was a matter of twenty-five or thirty minutes time in the obtunding of every cavity it really was almost beyond consideration; but I succeeded a few days ago in securing complete anæsthesia in one minute and a half, in a cavity similar to the one spoken of by Dr. Palmer, but not as extensive situated in a lower canine, and which extended under the free margin of the gum quite a distance. I applied the solution with the electric current for a minute and a half with the idea of first obtunding the gum and getting a superficial effect on the tooth so that I could apply a clamp, expecting to apply it the second time for a deeper effect after placing on the clamp; but before doing that I thought I would see how far the effect had penetrated into the tooth, and I found all sensitiveness had been taken away. I proceeded to excavate the denuded surface and made my retaining points and grooves, cutting a little farther than was really necessary; and this effect was obtained in one minute and a half. I have my assistant stand by me and take the time by the watch in every case that I do since I commenced this series of experiments. And the preparation I used was not guaia-cocaine. It was a preparation which any gentleman can make in his office: simply fifteen per cent. of cocaine in electrozone. What it makes I do not know. I asked Mr. Woolf that question to-day, and he gave me an answer that I could not quite understand. However, this combination certainly makes the preparation that we are after. The first result of mixing them together is that the solution turns a creamy white color for a moment, then turns to a deep yellow. What it is I do not know, but the effect of the preparation—and I have used

it right alongside of other preparations—is remarkable. I only hope that you gentlemen will experiment on that and see what results you can get in the same line. In other cases than the one I speak of I have had complete anæsthesia in a somewhat longer time,—three and a half to five minutes. In one case, where I used a salt solution, the time occupied was twenty minutes, while in another and similar case I used an electrozone solution and obtained a better result in five minutes.

Dr. Palmer.—Mr. President, did I understand Dr. Brown to say that in the case where the anæsthesia occupied a minute and a half he applied the obtunding solution to the gum?

Dr. Brown.—To both the gum and the tooth.

Dr. Palmer.—Did you apply it after putting on the rubber dam?

Dr. Brown.—No.

Dr. Palmer.—How far below the margin of the gum did it extend?

Dr. Brown.—About half an inch.

Dr. Palmer.—It has been suggested to me that in the case of incisor teeth, particularly, it should be applied to the mucous surface before putting on the rubber dam so as to reach the nerve-supply of the tooth; it being claimed that in that way you anæsthetize the tooth quicker and the effect is more lasting.

Dr. Brown.—After the first series of experiments that I made I was talking with Mr. Wheeler about the results, and he could not understand the matter, because he thought that when the application was made to the membrane it would be carried off by the current or the circulation through the membrane, and would not have the proper effect on the tooth, but we secure the result in spite of theory. I do not pretend to know scientifically why it is.

Dr. Richards.—Mr. President, Dr. Meeker has been experimenting in this line to quite an extent, and I have no doubt the members present would be glad to hear from Dr. Meeker the result of his experience.

Dr. Meeker.—Mr. President, I would like to speak first about Dr. Guy's paper. I think it is one of the best papers, and from a lay member, that this society has ever heard on the subject of cataphoresis or of electricity; it is the most easily assimilable; and I am glad it has been read to-night. As the president has stated, it was to have been read at our annual meeting, but it did not reach me until about half-past eleven that night, so, of course, it could not be read then, and Dr. Phillips answered to the toast to which Mr. Guy was to respond. I have no doubt that next year

we will be able to announce for this meeting that we will have Nikola Tesla here. Things are in such condition now that I think he will be with us, although I cannot positively say that he will.

In regard to the bleaching of teeth by means of cataphoresis, or by the usual dry heat method, I have been doing that now for about four years; and Sunday before last I looked over my list of cases, and found that in those four years but three cases have returned to me out of many hundreds that I have bleached. I think that a pretty good average. I have bleached for my own patients and for my friends in the profession here in Newark, and in New York, and other cities. My experience with hot and dry air for this purpose has been perfectly satisfactory so far. Among the cases that came back was a central incisor that had a How pin in it which had turned green, and I could not get it white. In the other two cases I think the canaliculi of the teeth above the gum were so permeated by decomposed pulp-matter that it was impossible to bleach the teeth; the coloring-matter seemed to run down again after they had been bleached, and again turned them dark. Those I have cut off and replaced by artificial crowns. In my experience with cataphoresis, so far I have been quite successful. To-morrow I have two patients promised me by Dr. Walker, at a clinic before the Odontological Society, at the Academy of Medicine, New York. They are said to be very black; I have not seen them but I have no hesitation in saying, from my previous experience, that I will bleach them white, provided there is no inflammatory action going on at the apices of the roots. I have not been able to use the Wheeler volt-selector. I have an eight-cell battery, and when I use electricity for bleaching, I use the full strength of the eight cells, with an aqueous solution of pyrozone. I have not yet used electrozone for this purpose. Pyrozone has been perfectly satisfactory as a bleaching agent so far. Electrozone may be theoretically preferable. I have not tried it, but I am willing to try it and see whether it is good. The theory is all right. In regard to the use of electrozone with cocaine I will say that Dr. Brown informed me in regard to it, and on Sunday I prepared some for use in the morning, having a case to treat, a lateral incisor, which I think I dreaded just as much as the patient for whom I was to fill the tooth. She was of a very nervous temperament, and I felt that I could not, without giving her a great deal of pain, excavate the tooth so as to fill it. So I applied Dr. Brown's preparation of electrozone and cocaine for about fifteen minutes. Then I opened up the pulp-canal with a Donaldson broach, and excavated the

tooth without causing any pain whatever. I filled the tooth, and the lady went away rejoicing.

Dr. Sanger.—When Dr. Brown was speaking of using a cocaine solution on the gum, the thought occurred to me whether he observed the toxic effect of cocaine, whether the cocaine was taken into the system through the circulation, as it would be if introduced by means of a hypodermic syringe, and with the same danger of toxic effect.

Dr. Brown.—I will say that this is a point in which I am most deeply interested, and I am not yet ready to give any positive opinion on it. I asked a number of authorities before starting, how it would work in that respect, and the consensus of opinion seemed to be that the action of the cocaine was limited, and that the toxic effect, if it occurred at all, did not take place until after the cataphoric effect was over. I think the fact of the matter is that you never can tell when you will have the toxic effect until the patient exhibits it. For instance: I know a man who is the most absolute picture of health that you can imagine; you would think he could take anything from a gallon of whiskey to a quart of cocaine, and never have it affect him; yet last summer he went to a dentist, down in one of the sea-shore resorts, to have a wisdom-tooth, erupting with difficulty, attended to; they wanted to lance it, but the gum was so inflamed that they could not touch it, and a four-per-cent. solution of cocaine was injected. The relief was instantaneous, but when the gentleman undertook to leave the chair he dropped to the floor and was unconscious for three hours. No one would have expected a toxic effect in that gentleman. It is not like administering an anæsthetic where you can tell by watching the heart of the patient through the pulse, if you are careful. I have carefully watched my cases, and I have not noticed any toxic effect or variation of the heart's action, nor have I as yet seen the slightest indication of any such change; but I think it has not been used long enough for one to form an opinion on that point. I would suggest to any gentleman using it that he carefully watch the pulse of the patient. I never use cocaine hypodermically.

Dr. Osmun.—Mr. President, all the talk to-night has been from the side of the operator; I want to talk to you now from the side of the victim. Two weeks ago, Saturday evening, Dr. Van Woert applied the cataphoric current on a lower canine—a buccal cervical cavity—of mine, that was so intensely sensitive that I could not brush it, the slightest touch of the tooth-brush gave it pain. Dr. Van

Woert made the application for about fifteen minutes on the gum tissue and on the tooth itself, with a thirty-per-cent. aqueous solution of cocaine. He experimented a little with the current, starting with a low voltage at first, and there was no pain whatever. Then he turned on four or five times as much, which gave acute pain and was unbearable. He then turned off the current and renewed it gradually, a little at a time, and it caused no pain whatever; and the tooth became perfectly insensible. It was not filled at that time, but was probed deeply, and the gum was also probed, and both were absolutely painless. The gratifying part is the fact that the tooth has been absolutely painless ever since. I have sent an excavator in every day without finding any sensitiveness; while outside of the zone of cataphoric application the tooth is just as sensitive as though there never was any cocaine used. That would seem to prove conclusively that the cocaine did not enter the circulation, or was not carried to any extent beyond the point at which it was applied. I think that is a very important fact, because if you can produce local insensibility of the tissue and retain that insensibility after the filling has been inserted, it is a very great thing. You know that usually there is a condition of hypersensitiveness or pain for two or three days to five or six weeks after such operations.

Dr. Riley.—I would like to ask Dr. Woolf to give us the chemical change that has taken place when electrozone and cocaine are used in that way.

Dr. Woolf.—I became interested for the first time in this matter of cocaine and other materials used in dentistry to-day when I happened to wander into Dr. Brown's office.

What I learned from Dr. Brown of the results of his experiments struck me as very peculiar, and I am free to confess that I cannot possibly understand under what conditions the action of this material in conjunction with cocaine should produce the wonderful results that Dr. Brown has described to me. That the electric current will pass through the tissues; that electrolysis, would possibly or positively take place in the passage of the current, and that the positive and negative elements would be liberated in this electrolysis is easy enough for all of us to understand; but how the electric current can convey or carry with it the properties contained in cocaine I am free to confess that I am at a loss to comprehend. The question is so remarkably interesting to me, and so undecided in my mind, that it will be a source of pleasure to me to delve more deeply into the subject; and, without endeavoring to appear at all

presumptive to the Association, I will communicate to you at the earliest possible date the result of my experimentation. There is, in my mind, no possible way, by passing an electric current through the sensitive tissue, of carrying the properties of cocaine with that current. It may be possible to intensify, to set up an activity in the membrane, and so make the membrane more sensitive to the action of cocaine; it may be possible that the cocaine would in some instances have its effect regardless of the electric current, and it may be possible that the electric current would act without the cocaine; but the fact that Dr. Brown tried cocaine alone, and tried electrolysis alone, and tried the different elements of the material alone, and in none of these instances did he get the results that he obtained from making the experiments with cocaine and the electric current, left me undecided concerning what the action was.

Dr. Brown.—As to this combination, I do not claim to have made, personally, any discovery. Dr. Van Woert suggested salt water; that brought up the idea of using electrozone with cocaine. As Dr. Osmun has talked from the stand-point of the patient or the victim, I think I will tell something about the patient too. To a considerable extent our work in this line is experimental, we do not know what we are doing. I used with the most perfect results, requiring too long a time, however, a saline solution on two superior incisors, and the patient was delighted. I did not see him for a week after, and when I did he said he had not recovered from the cataphoresis. He said he felt nothing until about the end of twenty-four hours, when he commenced to have a queer feeling in those teeth, and he had that for three days afterwards. He said it was the same sensation that one feels when we raise the current of electricity. And right there was another peculiar point. On one of the teeth I used fifteen volts, and on the other I used forty volts without having a particle of bad effect. In both cases it was successful as far as the clinical work went. I have examined the teeth since, and they are in perfect condition. They are alive, there is no hypersensitiveness to heat or cold, and the filling is all right; but for three days they were very uncomfortable. We may as well report those cases as the others.

The President.—Dr. Adelberg has had some experience with cataphoresis, I will call upon him.

Dr. Adelberg.—My experience, Mr. President, has been very limited, and there is so much uncertainty about it that it is hardly worth while reporting. I had two cases in one day that I treated cataphorically, almost the same kind of cavities in each case; in

one case I used the saline solution in connection with cocaine, and obtained perfect anæsthesia in eight minutes with an application of thirty-four volts, and prepared the cavities without a particle of pain. In the other case, the same afternoon, I could not possibly use over six volts. I tried it for fifteen or twenty minutes without success. So my experience so far is very experimental.

Dr. Brown.—I believe the president has had some experience; I think we might hear from him.

The vice-president, Dr. Fish, takes the chair.

Dr. Woolsey.—In the two weeks that I have had my machine I have made some use of it and had some good results. I had a peculiar case on Monday morning, a young lady not in very good health, about sixteen years of age, and it seemed almost impossible to obtain the desired result from cataphoresis. I was working upon a central incisor; the current caused pain, and it seemed impossible to get the voltage up to ten volts. The next day, Tuesday, I tried it on the same patient, in a large approximal cavity in a bicuspid, and it was perfectly successful. I was able to raise the voltage in twelve minutes to about twenty-five volts, and was able to work on the tooth without causing a particle of pain. The patient is very sensitive to the use of the bur, generally objects to its use. In this case I wanted to place in a gold filling, so there was more cutting required than in other cases. In some cases I have had good results, but it has taken a considerable length of time, and that has been discouraging. In most of those operated upon it has taken from twelve to fifteen minutes. In one case by applying the electrode to the neck of the tooth instead of in the cavity I seemed to get a better result. Whether there is anything in that or not I do not know, but it seemed so in that case. I find that by mixing my cocaine solution at the time of using the effect is better.

The president resumes the chair.

On motion of Dr. Richards the subject was passed.

Dr. Meeker.—I would like to announce that Dr. Twilley, of Baltimore, will give us a paper in June, and Mr. Davis has promised to have an electric fan here to keep us cool. I will also say that any gentleman who would like to go on the excursion to the proposed colony on the Delaware on the 29th of May, to spend Decoration Day and Sunday, will please leave their names with me the day before the 29th.

Adjourned.

H. S. Sutphen, D.D.S.,
Secretary.

Editorial.

AN OLD SUBJECT REVIVED.

It would seem a useless expenditure of mental strength to endeavor to counteract all the open attacks made on dental colleges and the National Association of Dental Faculties, and we recur to this subject with reluctance, but the short article in the present number on this subject seems to require an answer, not so much because of any new or a clearer statement of the question, so often discussed, as from the fact that it contains some oft-repeated views which must be regarded by experienced teachers as radically wrong, and yet these are held by a very large number of the most progressive minds in the dental profession.

In an article in a previous number, it was asserted that the tendency of dental teaching was towards a medical degree as a prerequisite to the dental. It is still believed that absorption in the medical will be, right or wrong, the ultimate end of the dental profession.

It is unnecessary to recall the history of dental work the world over. It has been an independent movement, and has gradually developed from crude beginnings to a position in which there would seem to be a necessity for a consideration of the question in its intricate relations to medical science. The change, if change be made, will not come through the writing of essays or caustic remarks on the present methods of colleges. It would be a useless waste of time to attempt to argue that dental colleges are perfect; indeed, the entire scheme of education in this country is very far from the state of almost perfection reached in some foreign countries. It is freely acknowledged that dental education is in process of evolution, and, therefore, must of necessity be in a degree imperfect, for the word itself means a process of unfolding, an effort to reach a higher standard.

It is conceded that "a complete medical knowledge for the dentist creates a power of conception," or rather would were it possible to give any graduate, medical or dental, a complete knowledge of medicine in all its branches. This must be recognized as an impossibility. Medicine to-day is made up of a series of important

specialties. The general practitioner transfers his patient, when the case is beyond his skill, to the surgeon, ophthalmologist, otologist, gynæcologist, laryngologist, etc., nor would he be justified in treating such cases.

The argument of the essayist, and such as hold with him, is, that "the dental student should only be taken from the ranks of the medical profession." What constitutes the basis of medical instruction? First, a fairly accurate knowledge of human anatomy, physiology, pathology, chemistry, histology, materia medica, pharmacy, obstetrics, and surgery. These are regarded, very properly, as foundation studies, others elective. If, then, this be true, can this knowledge be acquired outside the walls of the medical college proper? Is there anything in the atmosphere there that gives the student an indefinable something not to be acquired or experienced in other schools teaching the same branches? Is there anything in the degree of Doctor of Medicine which will have a tendency to make a man more profoundly learned in the science, if it be a science, of treating disease? The answer, it seems to the writer, must be in the negative. It is recognized that association in any line of work is of marked advantage to the individual and induces a professional enthusiasm not obtainable by the study elsewhere, but beyond this and the supposed dignity which accrues to a young man who can write M.D. after his name, there would seem to be little or nothing gained.

If the position be the true one in regard to the foundation studies, then the query naturally arises, Can these studies be made in dental colleges equally as well as in the medical? No one familiar with the best dental teaching of to-day would attempt to assert to the contrary, except in one instance, a subject not important to the dentist. It is probably true that in many of the dental colleges of the country these foundation subjects are indifferently taught and some are omitted altogether. The study of anatomy is not one to be confined to the head, but comprises the entire organism, and no reason exists why it should not be thoroughly taught in all dental schools. The kind of partial culture alluded to has long since been relegated to the superficial curriculum of the past. The effort at the present time, and to a very large degree successful, is to give a thorough training in all these foundation branches. This will, in the nature of things, require years to perfect, but the work of the best dental colleges, even as at present arranged, is so far removed from that of twenty-five years ago that comparison cannot be made.

"Our dental colleges are pursuing an entirely wrong course in the method of their teaching." Presuming that our critic is entirely familiar with the best dental colleges of the country, it would seem that he is in duty bound to explain wherein the course adopted by these institutions is wrong. The remedy is given in a line. "There should be but one profession, and that the medical."

The force of this is not so apparent as the essayist seems to imagine. It is not clear that the medical profession has any reserved right to absorb all the branches of human activity that impinge in a near or remote degree upon its supposed domain. On the contrary, it is surmised that independent work outside of the ruts of tradition, untrammelled by precedents of a thousand years, may produce a new and a higher form of energy outside of and not particularly obligated to the mother calling. It is a law of development that the offspring will find strength and more perfect growth in independent fields and will be equally weakened in proportion as it receives nutrition alone from the mother source. In illustration of the working of this law we may refer with confidence to the energy, freedom in application of new processes, enlarged growth of dentistry, untrammelled as it has been in a century of development, and compare this activity with that of the specialties of medicine that have been developed, as such, alongside of the parent stem.

Without continuing this line of argument further, it must have been clearly evident to practical observers that the dentistry of the present covers such a wide field in mechanics alone that any attempt to make the study of medicine as a prior requisite to the study of dentistry must result in failure. The work of the dentist is necessarily, in its foundation, a manual cultivation. The development of dexterity in handling tools must be acquired somewhere and somehow. This cannot be accomplished in a medical college. Start a young man of twenty in a medical college, fresh from his literary training in the schools, and oblige him to spend four years in the study of the fixed branches of a medical education, what will be the result? He may graduate at the end of that term at twenty-four with not the slightest practical knowledge of the work he is expected to follow,—that of the practice of dentistry. He then takes up the latter work for another course of three years, or, perhaps, with his credits, two years. This, it is conceded, is none too long, but how many men will make good practical dentists after twenty-four years? A very few naturally gifted may, perhaps, accomplish manual dexterity, but the majority would prove sad

failures. This is the experience of the writer with that class of men, and, in the nature of things, it can never be otherwise. Progress is not made by retrogression, and the average man will regard the effort to study dentistry after a full course in medicine in that light, and however he may desire to acquire it, dignity and lack of practical training steps in and rebels.

The true course, in the opinion of the writer, is to make dental colleges thorough in all the foundation branches of a medical education, and the higher schools are rapidly approaching this standard. The work in these institutions has become so severe that the question is beginning to be heard in the faculties, "How are we to teach dentistry with the students overloaded with strictly medical studies?" It is a serious problem and will have to be considered in the very near future. There seems no way out of the difficulty but by a lengthening of the course to four or even five years.

With the present curriculum of the best dental schools a young man will have no difficulty in taking the course in medicine as a post-graduate work, and those who do continue their studies further find a rich reward, not in the degree obtained, but in that additional mental training in the branches already taken.

Criticism is a valuable aid to progress when conducted in the right spirit and based on knowledge, but that which has its origin in prejudice and a superficial acquaintance with modern methods of work must not only fail, but be the cause of injury to the efforts already made to advance the standard of dental education. The dental colleges of the country are rapidly progressing to an advanced medical training, but this should be gained not by following traditions within medical walls but in the freer air of an independent curriculum.

DR. WILLIAMS AND THE ASSOCIATION OF FACULTIES.

Dr. Williams in his recent series of valuable papers, running through several numbers of the *Dental Cosmos*, takes occasion, in a foot-note, page 464 of the June number, to criticise the action of that body in indorsing Dr. Bödecker's book. We quote in part this note:

"Professor Heitzmann and his pupils, particularly Drs. Bödecker and Abbott, have during the past fifteen years laid great stress upon their claims to the discovery of a minute structure of living organic matter in enamel. . . . Those of us who have long been familiar with these errors did not attach any

special importance to the 'vain imaginings' of the Heitzmann School until these errors received the indorsement of the National Association of Dental Faculties. That action removed the entire question beyond the realm of personal controversy. It has now become a matter of national importance to the dental profession in America, and the question is, Are dental students in the United States to be taught theories of dental histology which are only mentioned by scientific men of standing, the world over, with contempt or ridicule? Let it be distinctly understood that it is not a matter of opinion, but of fact, and it is facts which the National Association of Dental Faculties of the United States have to face in considering whether they will withdraw their indorsement of a book scarcely a page of the histological work of which is free from some statement that the dental student will not have to unlearn."

It is evident from this quotation that Dr. Williams does not understand the action of the Association of Faculties, and, in future, it might be well to familiarize himself with its methods of work before he publicly holds up a body of earnest workers to wholesale condemnation.

The indorsement by that body is given after a careful examination by a standing committee appointed for that purpose. The recommendation is not understood to carry with it any indorsement of the peculiar views held by an author, or is its action binding in this respect upon the colleges constituting its membership; and, further, the recommendation does not go so far as to even suggest that any work so recommended shall be used as a text-book in the colleges, although that word has been used, but it simply means that an author has published a book worthy of consideration by men engaged in teaching, and does not carry any force beyond that statement. If the ideas conveyed therein are in accord with those held by any given faculty they may be taught, or if in opposition they may be antagonized. The Association of Faculties has nothing directly to do with the teachings of Dr. Williams, Dr. Bödecker, or Dr. Abbott, but leaves the matter to the judgment of its individual members. It is not probable that any well-organized school would accept the productions of either of these gentlemen as a finality or adopt them as text-books, but would regard them as valuable works of reference, a place they very properly hold in dental literature.

The position held by the National Association of Dental Faculties is a dignified and proper one, and is not likely to be changed by any criticism come from what quarter it may.

Obituary.

DR. C. W. SPALDING.

Died at Riverpoint, R. I., June 9, 1896, Dr. C. W. Spalding, in the eighty-second year of his age.

Dr. Christopher W. Spalding was born March 15, 1814, in Rhode Island, of Scotch origin. His ancestors were prominent in the Revolutionary War.

Dr. Spalding received a common school education. In 1840 he removed from his native State to New York State. In the same year he began his professional studies and received the degree of Doctor of Dental Surgery in 1851, and that of Doctor of Medicine in 1869.

In 1847–48, Dr. Spalding spent a year in Savannah, Ga. In 1849 he removed from Ithaca, N. Y., to St. Louis, where he resided for many years.

He took a leading part in the organization of the Western Dental Society in 1851, and has been prominently identified with the American, several State and city associations, and has been actively engaged in every good work which would tend to elevate the profession of his choice.

He was also an ardent advocate of the homœopathic school of remedies, and was very successful in their administration.

In 1838, Dr. Spalding married Miss Cornelia Anna Erb, also of Revolutionary stock. Of this union there is one son, Dr. John H. Spalding, who succeeded to his father's practice in this city.

Dr. Spalding and wife, whose death preceded his over a year and a half, removed to Rhode Island August, 1890, to spend their declining years in the State of their nativity.

In the death of Dr. Spalding we have lost an earnest and faithful laborer in the healing art.

Resolved, That a memorial page be set aside in the Society's Transactions and a copy furnished the journals for publication."

H. J. McKellops,
William N. Morrison,
J. B. Newby,
Committee of St. Louis Dental Society.

St. Louis, Mo., June 10, 1896.

Current News.

HARVARD DENTAL ALUMNI ASSOCIATION.

The silver anniversary and twenty-fifth annual banquet of the Harvard Dental Alumni Association was held at "The Thorndike," Boston, on June 22, 1896, with sixty-three members and guests present.

Reports of the secretary, treasurer, and committee on Harvard Dental School were submitted, showing the prosperous condition of the Association, etc.

The invited guests present were Rev. Reuen Thomas, D.D., Brookline; Hon. Harvey N. Shepard, Boston; Rev. Willard T. Perrin, S.T.B., Boston, and Mr. John H. Colby, ex-councilman of Boston city government.

The post-prandial exercises were inaugurated by President James Shepherd, who feelingly alluded to the deaths of Professor Thomas H. Chandler, dean of the Dental School, and Frederick H. Woodcock, instructor in mechanical dentistry. He then called upon the new dean, Professor Eugene H. Smith, as the first speaker. Dr. Smith, after eulogizing his predecessor and Dr. Woodcock, spoke of the wants of the school,—that greater facilities were needed for increasing the scope of its work. A new building was a necessity, now that chemistry was no longer to be taught in the medical school, and must be in the dental building; also that an endowment fund was required. The graduating class numbered twenty-two, the largest within its history, and though the requirements are yearly becoming severer, yet the number of students continue to increase. Each guest responded in a happy vein with an excellent speech, and in a few instances in a humorous manner.

The following named officers were elected for the ensuing year: President, Frank Perrin, D.M.D., 1877; Vice-President, Joseph T. Paul, D.M.D., 1891; Secretary, Waldo E. Boardman, D.M.D., 1886; Treasurer, Washburn E. Page, D.M.D., 1877.

Executive Committee.—Waldo E. Boadrman, D.M.D., chairman; William P. Cooke, D.M.D., and Harry S. Parsons, M.D., D.M.D.

The council is composed of the officers of the Association.

Waldo E. Boardman, D.M.D.,
Secretary.

Boston, June 25, 1896.

THE

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Original Communications.[1]

NASAL OBSTRUCTIONS WHICH RESULT IN MOUTH-BREATHING, WITH SPECIAL REFERENCE TO ADENOID VEGETATIONS.[2]

BY GEORGE L. RICHARDS, M.D. (HARV.), BOSTON, MASS.[3]

Before taking up the main subject which I wish to consider this evening, it may be well for us briefly to review our knowledge of the anatomy and physiology of the nasal organs, as only by a proper appreciation of their normal anatomy and physiology can we hope to understand their pathology and treatment.

Anatomically, the nose is the beginning of the upper air-tract, being continued below by the pharynx, larynx, and trachea. In construction it is both bony and cartilaginous, and consists essentially of two cavities—a right and a left—separated by a partition wall,—the septum. The septum is cartilaginous in front, bony behind. The bony portion is formed by the *vomer*, beginning at the posterior superior border of the choanæ and extending in a gradually descending line forward almost to the anterior nasal opening, and the perpendicular plate of the ethmoid, which overhangs the vomer and extends to the lower border of the nasal bone. The anterior inferior portion is called the lamina quadrangularis, or quadrilateral cartilage, and remains for the greater part of

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the Harvard Odontological Society, November 21, 1895.

[3] Matriculate of the Universities of Vienna and Halle.

life cartilaginous. It is important to remember that the septum reaches above to the lamina cribrosa of the ethmoid, and that through this pass the filaments of the olfactory nerve, to be distributed over the upper two-thirds of the septum. Projecting into the cavity of each nostril are the inferior, middle, and superior turbinate bones. The inferior turbinate is a separate bone, and lies on the superior maxilla, partially covering the opening into the antrum, and extending a little behind the posterior choana. The superior and middle turbinates are a part of the ethmoid bone, and are attached to the vertical plate. The superior is visible from behind only, while the middle and inferior are visible from in front. All these bones have a concave and a convex surface, the convex surface presenting towards the septum. Opening into the nose are the outlets of a number of accessory cavities,—viz., the antrum, frontal sinus, anterior ethmoidal cells, posterior ethmoidal cells, and sphenoidal cells. These cavities are already indicated in the new-born, and reach their full size soon after the second dentition.

The antrum, the largest of the accessory cavities, lies in the superior maxilla, its opening, the hiatus maxillaris, being partly closed by the laying over it of the inferior turbinate, together with the processus uncinatus of the ethmoid. The spaces remaining in the bony wall are covered with mucous membrane, with the exception of the normal opening into the hiatus semilunaris. The antrum comes in front as far forward as the inferior turbinate, behind not so far; above it reaches to the orbit, below to the alveolar processes of the teeth (viz., the last bicuspid and first two molars), —*i.e.*, lower than the floor of the nose.

The frontal sinus begins at the root of the nose, occupies the region over the eyebrows, and reaches half as high as the forehead. It extends outward about two inches (five centimetres). The partition wall is almost never in the middle line, but more to one side or the other. The two never communicate. Below, the sinus extends usually to the region of the anterior end of the middle turbinate, and its opening will be found in the hiatus directly in front of that of the antrum.

The ethmoid cells lie over the middle meatus. They have no direct outlets except orifices, with simple gaps in the outer and upper walls of the middle meatus. The anterior and posterior cells open often in the superior meatus also. One of the anterior ethmoidal cells is especially prominent, and forms the outer wall of the hiatus semilunaris. This is the bulla ethmoidalis,—somewhat larger than the other ethmoid cells, and projecting forward as a

spherical mass. Not seldom is an ethmoid cell found in the anterior portion of the middle turbinate bone. When considerably enlarged it forms the so-called bony enlargement of the anterior end of the middle turbinate. This can reach the size of a nut. On the outer side the ethmoid cells reach to the orbital cavity; consequently it can come to pass that in affections of these cells the eye can be pushed outward and downward, causing double sight.

The sphenoid sinus lies in the body of that bone behind the posterior wall of the nose, above the choanæ. Its walls are thin in adults, with the exception of the inferior, which separates it from the naso-pharynx. This is usually thicker. The cavity is always somewhat higher than the middle turbinate of that side. With the head in the usual posture for a nasal examination, a straight probe passed from the floor of the nose at the entrance to the middle portion of the middle turbinate, and then onward, would strike exactly the sphenoid cavity. The natural opening lies somewhat higher than the posterior end of the middle turbinate, and behind the superior meatus.

The naso-pharyngeal cavity is bounded in front by the choanæ; on the side by the posterior nasal sulcus, the tube-opening, the cartilage of the Eustachian tube, and the fossa of Rosenmüller; posteriorly, by the axis, atlas, and occipital bones; the roof is formed by the occipital and sphenoid. The velum palati is the anterior inferior border. The anterior lip of the Eustachian tube is much the smaller; the posterior lip is extended downward to the salpingo-pharyngeal fold. The fossa of Rosenmüller lies behind and above the tube-opening.

The tonsils lie between the two palatine arches, and may normally project a little beyond the anterior arch. They contain many lacunæ, which act as sources of trouble in affections of this organ. The relation of the tonsil to the great vessels in the neck is important. They lie quite a distance behind and to the outer side of the tonsil; hence there is little danger of their injury in the operation of tonsillotomy. Bleeding after tonsillotomy comes either from parenchymatous bleeding, due to abnormal widening *of* or changes *in* the twigs of the tonsillar artery, or from cutting a twig of an artery of some size. The tonsillar artery is not constant in origin, sometimes coming from the ascending palatine or external maxillary or ascending pharyngeal, even direct from the carotid. The external maxillary can come very close to the tonsil, and the ascending pharyngeal as well.

The nose, with its accessory cavities, is lined with mucous mem-

brane, which, except where there is spongy tissue, is very closely attached to the periosteum or perichondrium. In the upper portion of the nose, that concerned more especially with the sense of smell, the epithelium is ciliated, while in the lower, more concerned in breathing, the epithelium is pavement celled, the border line, which is not constant, lying in the middle meatus. Mucous glands are the only ones present, and they are abundant. Cavernous tissue covers the inferior turbinate and a portion of the anterior end of the middle turbinate. It consists of connective tissue, stroma, smooth muscle-fibres, and elastic tissue. Underneath the subepithelial layer is a net-work of sinuous, wide, anastomosing veins that course at right angles to the surface of the turbinate tissue. In order to provide blood the finer arteries course corkscrew-like through the tissues. This tissue can swell so as to touch the septum, or contract so as to almost disappear. It is presided over by the sympathetic branches of the trigeminus, coming from the spheno-palatine ganglion. The blood-supply of the nose is very abundant, coming mostly from branches of the internal maxiliary. The veins communicate with those of the brain.

The olfactory nerve, passing through the cribriform plate, spreads itself out on both sides of the septum, down as far as the middle meatus. Consequently smell is limited to this region.

Physiologically, the nose has three important functions: First, as the seat of the sense of smell. Second, it assists in the formation of the voice, producing the overtones, and, in connection with the naso-pharynx, acting as a resonator. In the production of most sounds the soft palate is raised against the pharyngeal wall and the nasal cavity is more or less cut off, while in uttering *m*, *n*, or *ng*, the purely nasal tones, the palate is relaxed, and the tone passes through the nose with the expired air. For the production of a good voice it is absolutely essential that the whole upper air-tract be free from obstruction. Third, it is the beginning of the respiratory tract, and, as a receiver of the outside air and carriers of the same to the pharynx on its way to the trachea and lungs, warms and moistens the inspired air, and in a measure removes the dust.

As a result of the experiments of Bloch, Aschenbrandt, and Kayser, the following important facts have been demonstrated:

First. The temperature of the inspired air after passing through the nose is considerably elevated, according to the following formula, in which $E =$ the degree of warming, $v =$ body temperature, $t =$ temperature of the outside air (Bloch): $E = \frac{5}{9} v - t$. If the temperature of the outside air is 40°, then $E = \frac{5}{9}$ (98.6 — 40); $\frac{5}{9}$ (58.6)

= 32.6, which added to 40 = 72.6, the temperature after leaving the nose. Other authorities say the air is raised always to 86°. The relatively narrow canal, but really great area of surface over which the air passes in the nose, satisfactorily explains this. The amount of warming is considerably less when air is breathed through the mouth. Expired air is one to three degrees warmer than inspired.

Second. Inspired air on leaving the nose is nearly saturated with moisture, receiving from five to seven thousand grains in twenty-four hours.

The blood-supply of the cavernous tissue, from whence the heat and moisture mostly come, has a direct relation to the degree of cold and moisture of the external air, being increased as cold and dryness are present, and *vice versa.* In mouth-breathing the amount of moisture absorbed is less; furthermore, the mouth feels dry as a result, as any one who has awakened in the morning after a night of mouth-breathing well knows.

While the nose is not a perfect dust-collector, still it retains the greater part of the dust inhaled, which either remains there or is blown out by the current of expired air. In the mouth there is no provision for dust-collection.

It becomes, then, evident that the nose in its normal condition is perfectly adapted for the breathing function, no matter what the variations of temperature or moisture, and that the mouth cannot normally take its place or properly do its work. Whence it follows that mouth-breathing must be always pathological, and dependent upon nasal or naso-pharyngeal obstruction in some form.

Among the pathological symptoms which accompany mouth-breathing are: Bronchitis of varying degree, due to the inhalation of unclean, too dry, and insufficiently warmed air; tendency to the infectious troubles of the air-tract. Pharyngitis and laryngitis, both follicular and dry, of varying degree, with symptoms of cough, sore throat, hoarseness, and dyspnœa. Alterations in the voice, due to interference with formation of the nasal tones; voice easily tired; stammering. Dry mouth. Coated tongue and other digestive disturbances. Open mouth. Noisy respiration in the daytime, and snoring at night. A peculiar facial expression, alæ nasi flattened, pinched, or dimpled, bridge of nose often widened, and the veins thereabout dilated. Abnormalities of secretion, with inflammation of nasal mucous membrane, crust formation, fissures and cracks at junction of nose and lips, thickened lips, excessive lachrymation and nose-bleeding. Herpes and eczema may complicate. Chest deformities. Deafness. Loss of sense of smell. Dulness of intellect,

headache, backwardness, derangements of sleep, temper, spirits, energy, melancholia. Sneezing and reflex neuroses, including asthma, epilepsy, chorea, convulsions, stammering, aphonia, pertussis.

It may be thought that I have drawn a much exaggerated picture of the pathological possibilities, but such, I think, is not the case. Among the common subjective evidences of nasal stenosis, with accompanying mouth-breathing, as evidenced by the complaints of the patient, are the following: Sense of fulness in nose and head, a sensation as though there was a foreign body present, as in case of polypi. Dryness in mouth, pharynx, and larynx, especially on waking in the morning. Headache and frontal pain. Inability to breathe through the nose; this partial only or complete, as the case may be. Sore throat and altered voice. Impairment of smell and taste. Asthma. Chilliness or feverishness. Deafness and tinnitus. Disorders of common sensations.

The *causes* of nasal obstruction, arranged somewhat in the order of their frequency, are: Adenoid vegetations in the naso-pharynx. Hypertrophied tonsils, especially those which tend to meet in the middle line, and, with the arch of the tongue, block up the pharynx when the mouth is closed. Injuries to the nose from external violence having as their result septal deviations and spurs. These injuries have often taken place in early childhood, accompanied by a nose-bleed, and later have been forgotten. Hypertrophies of the turbinate tissue. Polypi. Foreign bodies. Syphilis, secondary, tertiary, and acquired. Malignant growths. Congenital atresia. Tuberculosis. These latter causes are beyond the scope of the present paper, as I wish here to consider only the more common causes of nasal obstruction, especially adenoids, particularly as seen in children.

In the naso-pharynx of young persons swellings are frequently found due to hyperplasia of the adenoid tissue normally there present. Meyer, of Copenhagen, was the first to call attention to the significance and importance of these growths. They appear in two principal forms. The first as a tumor-like growth, much resembling the normal tonsil, situated in the posterior superior wall of the naso-pharynx, often encroaching upon the point of origin of the Eustachian tube. This form has numerous furrows, the deepest being in the middle. The second form consists of a central mass or masses, with numerous projections hanging downward. With this form the whole mucous membrane of the naso-pharynx may be involved, the projections being inverted cones, but all more or less connected at their bases. There is also great varia-

tion in the absolute amount of the growth, varying from a few projections to complete filling of the naso-pharyngeal vault down to the floor of the choanæ. The first form is the more common, and is a much more solid growth than the second. Both forms are abundantly supplied with blood-vessels, very poorly supplied with nerves. They bleed readily, especially the second form. In consistence the first form is fairly firm; the second very soft, and feeling, one writer has said, much like a bag of worms under the finger. In structure they consist of a connective-tissue framework, filled with lymph-cells (nucleated), mucous glands, and many blood-vessels. The epithelium covering them is of the ciliated, cylinder type. They may show their presence in the new-born, but are most common from five to fifteen years of age, more seldom from fifteen to twenty, still more seldom before five or after twenty. After the age of puberty they not infrequently undergo spontaneous involution, the same as the normal adenoid tissue. Both sexes are affected in about the same ratio.

The cause is not very clear. Heredity and climate, especially the latter, seem to play a part, as they are found more frequently in the north and on the coast than inland and to the south. Scrofula, measles, scarlet fever, and whooping cough are also causative. In many cases obstruction in the anterior part of the nose has seemed to favor the growth. In still other cases no satisfactory cause has been found.

They produce trouble on account of their mechanical hinderance to the proper performance of the function of the naso-pharynx, and by reason also of the disorders in the secretions which they bring about in this region. By even moderate development they interfere very decidedly with breathing through the nose. The clinical picture is sufficiently common to be recognized readily by us all, provided the symptoms which the growth produces are borne in mind. The disturbance is most marked in childhood. The child snores at night, and breathes through the mouth in the daytime; cannot blow the nose properly; snuffs and snorts; the voice has a harsh character from the resultant laryngeal irritation. The nose has a flattened appearance; at the tip the alæ are widened. The face has a more or less vacant look. The nasal sounds are muffled,—*m*, *n*, and *ng* very much so. A good test are the words *music* and *many*,—"many men of many minds." The nose is apt to be full of slime, which cannot wholly be blown out; thick secretion is present in the pharynx or found hanging down from the naso-pharynx. In about one-fifth of the cases the tonsils

are enlarged, and granular pharyngitis is often present. Zarniko says that a high palate and anomalies of the teeth are found after the seventh year. Affections of the middle ear are present in three-fourths of the cases, especially catarrh of the tubes and purulent inflammation of the middle ear. Killian found in five hundred and forty seven cases of ear disease one hundred and one with adenoid growths, or 18.46 per cent. In ear affections of young children the naso-pharynx should always be examined. By anterior rhinoscopy, if the passages are roomy, the vegetations may be seen from the front, covered with some thick slime. Posterior rhinoscopy (very often not possible) will show a mass of adenoid tissue projecting from the roof of the naso-pharynx, thickest at the centre, hanging down over the choanæ and obstructing the free entrance of air. Sideways they encroach upon and even overhang the cartilages of the Eustachian tube, interfering with the valve-like action of the mouth-tubes, and preventing the easy inflow and outflow of air.

The growths vary in consistence from early to late childhood, being softer the younger the child. As the child grows the growths become less sessile, more compact, and finally, at about the age of puberty, sensibly diminish. They may, however, remain, and be an obstruction in adult life. In any event, the deformities and habits consequent upon years of mouth-breathing do not disappear with the shrinkage of the growth, while the high-arched palate, contracted nasal chambers, small round nostrils, and listless facial expression remain. Furthermore, there is frequently by this time a degree of impaired hearing which no future treatment can wholly remedy. In young children, where posterior rhinoscopy is usually impossible, the forefinger, guarded with a shield of rubber, or even by a piece of towel, can be passed up behind the soft palate just above the tonsil. It is then swept over the vault, and the presence or absence of the growths noted. When, as is often the case in quite young children, the growths are soft and not abundant, they can be removed with the finger-nail at the moment of examination. The amount of pain caused is not very great. The child is bound to cry, in any event, and some slight bleeding always follows the examination. Where the growths are abundant and the degree of obstruction considerable, ether to complete anæsthesia should always be given, and the operation done with care and without hurry. I am inclined to regard the finger-nail operation as poor surgery, and very apt to be incomplete, owing to the liability of leaving some of the growth behind. (This may return to a certain degree.)

In adults of fair will-power cocaine anæsthesia suffices. As a rule, in Germany no anæsthetic other than cocaine is used for either children or adults. The choice of an instrument and the particular mode of operating depends on the preferences of the individual operator. Some form of cutting forceps is used by many, but my own preference is for the Gottstein sharp curette or knife. It is a very safe instrument, and, if properly curved and properly held, cannot fail to remove all the growth. Three introductions are usually all that is necessary: first in the middle line, and then on each side, carrying it always to the top of the vault and close to the septum before beginning, then carrying it backward over the whole surface of the vault, bearing in mind the normal curvature. If the instrument is improperly held, it scarifies the mucous membrane only, and does not remove all the growth. The resultant hemorrhage is profuse for a few minutes, but soon ceases. Sweeping the finger-nail over the denuded surface after the operation gives us information as to the completeness of removal and lessens the hemorrhage. The operation may be done in either the upright or the horizontal position. When done in the upright position the child is firmly held by an assistant, facing a good light, the operator sitting in front. The mouth being held open with a good mouth-gag and the tongue held down with a tongue-depressor, the Gottstein curette is introduced behind the soft palate, to the vault, brought forward until it touches the septum, and then swept over the vault backward and downward. The instrument is withdrawn, and at the same moment the child's head is drawn quickly forward and downward, so that the blood and the piece removed drop into a dish at the side of the assistant. As soon as the bleeding subsides a little, the head is raised, the naso-pharynx swabbed with cotton or gauze, and the Gottstein curette again introduced, proceeding in this manner until all the growths are removed. As soon as the vault is clean the child is held head downward until the bleeding ceases.

For fear that blood or portions of the removed growth may enter the larynx or trachea, some operators place the child in the recumbent posture with the head over the edge of a table. The nose and mouth being now at the most dependent point, there is no danger of the entrance of blood into the larynx. I have tried this method, but prefer the operation in the upright position, and regard this when done with the aid of competent assistance as practically devoid of danger. Complete healing of the denuded mucous membrane takes about four weeks, though the soreness

immediately following lasts but a few days. A light diet and confinement to the house for a few days constitute the after-treatment. I usually also order an alkaline antiseptic spray for the nose and throat, to be used for a week or ten days. There is, of course, a slight risk of infection from the denuded surface, but practically there are no ill results. There may be a slight rise of temperature for the first twenty-four hours.

The operation *always benefits*, and should be urged upon parents in all cases where it is evident that the obstruction is considerable and dependent upon adenoids. While the good effect as regards freer breathing and improved speech comes at once, the improvement in the condition of the whole organism is best observed several months afterwards.

Time will not permit me to go into the details of the treatment of the other causes of nasal obstruction. Suffice it to say that turbinal hypertrophies should be reduced, spurs removed, septal deviations straightened, polypi and foreign bodies removed, syphilitic affections treated, and malignant growths handled according to the indications in each particular case.

I would also urge that recent injuries of the nose be carefully examined for any cartilaginous bending or breaking, which, easily rectified at the time, will later result in septal deviation or spur-formation that may result in serious occlusion of the lumen of one or both nasal passages. This is especially important in children, where beyond taking note of the nose-bleed at the time it occurs no notice is taken of such injuries.

Hypertrophied tonsils very frequently go hand in hand with adenoid vegetations, and when so present should be removed. They also exist independently. When large they frequently cause mouth-breathing, not only filling up the anterior and posterior pillars, but extending towards each other in such a way as to seriously encroach upon the pharyngeal space when the mouth is open. When the mouth is closed, and the tongue pushes the tonsils and uvula backward, the pharyngeal space may be almost completely occluded, and the free passage of air from larynx to naso-pharynx cut off. If at the same time adenoids are present, nasal obstruction may be complete. Removal of hypertrophied tonsils is usually easily accomplished with the Mathieu or Mackenzie instrument; they are sometimes so very flat and thick, and project so slightly beyond the anterior pillars as to render sufficient removal by these means impossible. In that case Leland's tonsil-knives, followed by the galvano-cautery, can be used to still further reduce them.

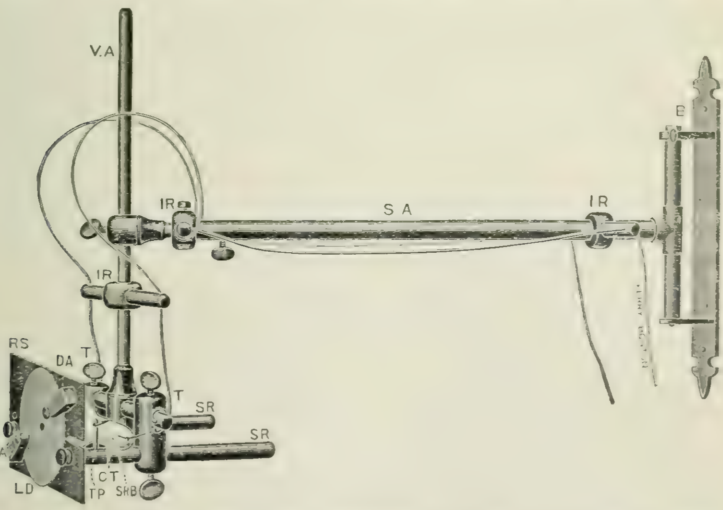
Tonsillotomy is easily done without ether, and the danger of bleeding is usually not great.

In conclusion, I would urge that the practitioner never order anything for the nose or for so-called nasal catarrh, be it spray, powder, or internal medicine, without first thoroughly examining the nose under good illumination, and with a good speculum. Were this more thoroughly done by the general practitioner, many a case that now goes to the specialist could be treated by the family physician.

DENTAL USES FOR RÖNTGEN'S DISCOVERY.—SUPPORT FOR TUBE.

BY WILLIAM ROLLINS, BOSTON, MASS.

In using currents of fifty thousand volts, which are required for properly developing Röntgen rays, it is comforting to feel that the wires carrying the current cannot come in contact with the patient. To accomplish this I employ the bracket shown in the figure. B is the bracket plate fastened to the wall about five feet



from the floor. To this is attached the swinging arm SA, movable horizontally. Inside this is another arm to which is attached the vertical arm VA bearing at its lower end the sliding rods SR, which are perforated on their upper sides with rows of holes into which fit the movable tube-pins TP, of hard rubber, which can

thus be made to hold tubes of several forms by means of the small elastic bands SRB stretched over the pins. To the ends of the arms SR is attached the hard rubber shield RS, which prevents the patient from coming in contact either with the terminals T, T, or with the Crookes tube CT. This rubber shield has a three-inch hole in the centre, which is partly closed by an iron diaphragm, LD, coated with lead. The diaphragm is easily removable to allow others with different sized holes to be used. This arrangement allows the object looked at to be seen dimly over a considerable area and illuminates brightly that special part which is held against the hole in the diaphragm. The diaphragm is simply a form of Zentmeyer's microscope stage. It is freely movable in order to bring the opening opposite any part of the bulb of the Crookes tube, and is held in any position by the two arms DA. The rubber rods SR are movable in two horizontal directions and in vertical arc, this latter motion being required where two or more tubes are used at the same time, a plan which gives more light but an imperfectly illuminated field. Where two or more tubes are used it is well to use a generator for each, as the attempt to run more than one tube from the same generator gives less perfect results. In regard to generators, I am sure that the static type gives better definition than the Tesla or any other form of coil. Static machines are inexpensive, and, if directly connected with small motors, run without noise or jar. They do not require to be of large size, one with two twenty-inch plates will properly excite a tube. It is, however, absolutely essential that they should be in a tight case, with sides preferably of glass, in which the atmosphere is kept dry. This is particulary important in using this type of generator for furnishing the current to be used in McGraw's method of driving cocaine into the teeth to stop the pain of cutting. It seems appalling to use a current of so high electro-motive force as fifty-three thousand volts on the teeth, but this is due to the fact that most of us, though familiar with the common static machines, have not realized what an enormous voltage they have. These high frequency currents are perfectly harmless, as has been shown by Tesla, provided the quantity is minute. In using them for McGraw's method the generator should be so small that the maximum current it can be made to produce is a small fraction of a milliampère. This is a better method than using a larger generator with a shunt circuit. I shall figure a generator for this use and one for exciting a Crookes tube in the October number.

AN APPARENT CASE OF SALIVATION.

BY C. W. STAINTON, D.D.S., BUFFALO, N. Y.

The recent sickness and death of a neighbor of seventy-five years furnishes a case of interest from both a medical and a dental stand-point.

In the nearly score of years I have known her she has never been strong. Her appetite was very delicate, and but few things could be tolerated, and food in very limited quantity could be taken at once. During the latter part of the past winter she had not been as well as usual, and one of our brightest and most progressive medical men was called to attend her.

He found her entirely free from cardiac, kidney, or hepatic complications; she seemed to be suffering solely from lack of nutrition, and efforts were directed towards obviating this difficulty. A few days' trial seemed to show that progress in this direction was not likely to be encouraging, from one-half to one teaspoonful of beef-tea being the limit. Any larger quantity caused considerable distress, and was soon ejected.

The secretion of saliva was abnormally large, and this constantly swallowed saliva was ejected towards the close of each day. After some time spent in unsatisfactory trial the physician in charge called in consultation a professional friend, who has made gastric troubles a more especial study than any one else in our city.

The attending physician had for some days entertained the suspicion that an old, red-rubber, upper set of teeth, which had been worn for twenty-five years, might be the source of the trouble.

The appearance of red, inflamed patches of the mucous membrane under that ill-fitting plate (a condition well understood by dentists as due more to mechanical irritations from ill-fitting, loose-shifting dentures than anything else) and the increased flow of saliva pointed in this direction.

The consulting physician coincided in this view. A suspicion was entertained by both that the pancreas was not performing its full duty. If this were true it would in part explain the conditions present. The set of teeth was removed from the patient's mouth and turned over to the professor of chemistry in the University of Buffalo. He took showings from the plate, applied the proper tests, and found mercurial reaction.

The suspicion that mercurial salivation was the chief trouble now seemed proved. Death of the patient subsequently occurred.

An autopsy revealed a stomach very much reduced in size, as though a surgical operation had removed all the depending portion, so that its appearance resembled a section of the large intestine.

This may offer an explanation of the small quantity of food tolerated at one time and also the periodical rejection of the swallowed saliva.

The liver was reduced in size considerably, but was secreting bile; the duct, very small, was open, and bile found in it as well as in the duodenum. The gall-bladder was full of gall-stones. The pancreas, like all the viscera, was much reduced in size, its structure considerably changed, the connective tissue unusually abundant, and the pancreatic duct *entirely closed.* No pancreatic juice could have been poured into the duodenum for a long time past.

This discovery put a new face on the matter. It was easy now to understand the increased flow of saliva. One of the digestive glands being practically obliterated, a vicarious effort had been made on the part of others to make good the loss.

See what proofs—strong as Holy Writ—in the hands of some theorists we have here to prove a case of salivation from wearing a red rubber plate. 1, the sore patches of mucous membrane; 2, the incessant flow of saliva; 3, the gradual wasting away of the patient; 4, the mercurial test.

The attending physician reported to me that the chemist found free mercury. This was an error. The test was a very delicate one for any preparations or forms of mercury. No free mercury was found.

It is a matter of regret that since the days of Wildman nothing has been added to our literature on rubber and its composition.[1]

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[1] Investigation of this question was very exhaustively made by the Pennsylvania Association of Dental Surgeons of Philadelphia about twenty-five years ago. That society appointed a committee, consisting of Drs. Wildman, Buckingham, and Truman, to examine into the subject. The mechanical, chemical, and microscopical were given to each in the order named. The report, in substance, demonstrated that the amount of free mercury present in vulcanized plates was infinitesimal, and on the polished surfaces nothing could be found. The writer of this, in numerous sections examined, found in two or three instances exceedingly minute globules under high powers of the microscope; but so thoroughly embedded were these in the impervious rubber that the possibility of causing local disturbance could not be entertained.

The cause of mucous irritation is no doubt due to uncleanliness on the part of patients and the presence of micro-organisms on the plate, as shown by Dr.

Some careful, patient, chemical, microscopical student has a large and important field awaiting him in this direction.

DENTISTRY, PRACTICAL AND THEORETICAL.[1]

BY WILLIAM SHAW TWILLEY, BALTIMORE, MD.

Mr. President and Gentlemen,—I wish to call your attention this evening to dentistry, practical and theoretical, the happy combination united, the condition separated, and the result when antagonized. A man who is a cultured, intelligent, "up-to-date" dentist, at home on every topic scientific, philosophic, well versed in theory, yet using his instruments with ease and dexterity; a skilful, mechanical operator; a man so endowed is considered by some a *rara avis*, yet such men exist,—a striking example to "remind us" "knowledge is power." Over these brilliant men theory exercises a potent fascination, and to them we owe the elevation of the profession to the high plane upon which it stands to-day; but they are comparatively few in number. Such is one I have in mind at present, a Chesterfield in manner and a dentist of rare excellence. He told me he would rather write an essay, the theory, as it were, of filling a tooth, twice over than perform the operation; but, said he, "I realize the importance of practical work, and I am still making every effort to perfect myself in that branch of the profession." That man is my ideal dentist. If perfect theoretically, strive to become so practically, and *vice versa*. But when practice and theory are separated, the dentist, college bred, the proud possessor of the honors of his class, has the theory all in his head, but not in his fingers,—"those four crafty fingers and a thumb,"—what wonderful power lies in those delicate members!

Why does the man whose theoretical knowledge is unassailable fail? He has no practical skill; or, if he possesses the talent, pays no special attention to its development. I can recall a member of the profession, an author of recognized ability, yet, as a good practical man, said to be a dismal failure. Possessing but little me-

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Black. The fact that a daily antiseptic wash prevents this irritation demonstrates very clearly the cause, and that it has nothing to do with free mercury supposed to be in the coloring substance (vermilion) of the rubber.—[Ed.]

[1] Read before the Central Dental Association of Northern New Jersey, May 18, 1896.

chanical talent, he does not realize his mistakes, and his prominence is based on his theoretical knowledge; yet he has succeeded financially. Such is the value of an author's fame. In marked contrast was a young man, whose operations and plate work were a pleasure and a dream, the most delicate, complicated gold work accomplished with rare skill, and yet failed year after year to pass the theoretical barrier raised by the Faculty of the College as a gauge of perfection necessary to enter the profession of dentistry. Ofttimes theory is antagonized by some old experienced dentist, conservative in his ideas, a man who has not kept step with the march of professional advancement. A young graduate arrives upon the scene fresh from his Alma Mater, and electrifies the people with his new wonderful theories of crown- and bridge-work and contour fillings; stigmatizes the dentist who has worked for his father and perhaps his grand-sire as an "old fogy," and causes the old practitioner who has grown gray in the honest practice of his profession to look upon him with the eye of suspicion and ill-concealed aversion. I find, upon inquiry, a majority of the young men who enter colleges east make this frank avowal: "I thought I could make more money out of dentistry than on the farm or in the shop;" or, "There is no dentist in our neighborhood, and I thought I could make a living." This is "poor timber," a bad foundation. What structure can we hope to build from such material? Struggling through their examinations, they start out to make money, no thought of theory or perfect practical work enters into their calculations. Such men often degenerate into mere charlatans, advertising impossibilities, and offering what they term the finest work in dentistry on the instalment plan. This class of dentists is composed largely of three grades of men,—the theoretical without mechanical ability, the mechanical with no theoretical capacity, and the young man who merely managed to pass his examinations.

The colleges are making every effort to raise the standard of dentistry to a profession second to none; to make the degree D.D.S. an open sesame to every portal, and with all my heart I wish them God speed. This noble ambition exists in all reputable colleges, and the State boards supplement and incite them to continue their efforts. It was quite popular in days gone by to ridicule the idea of theory and culture, or, to use a familiar term, "book-learning," in a dentist. Dentistry was considered merely a mechanical art; anybody could be a "tooth-carpenter;" but that day is no more; the people of the present demand that the dentist shall be an "up-to-date" man.

The high plane upon which the profession stands to-day, the recognition it has secured, is due to the energy, the subtle pen, the deep researches of our theoretical brothers. Their work is not completed when the sun goes down, but in the still hours they burn the "midnight oil," searching for the elusive little microbes, bacteria, and other scientific whys and wherefores that trouble the oral cavity. To these eminent dentists we owe a debt of gratitude. What "mountains of paper" and "rivers of ink" have been used by this earnest body of men to elevate and perfect this branch of the healing art! These theoretical dentists are like generals commanding armies; they plan, manœuvre, theorize, but upon whom does the battle fall? On the "rank and file,"—those men who execute the commands of the generals. It is the quiet, hard-working little fellow, who is afraid of the sound of his own voice in the association meetings, but toiling day by day with cunning dexterity executing the difficult handiwork which the great theoretical teacher pictures in "thoughts that breathe and words that burn."

Ah! dentistry is easy work theoretically. If I were to tell you how to construct the most beautiful piece of bridge-work in theory, the lines drawn closer than a hair's breadth, the strength unassailable, articulation rivalling nature's best, and as to cleanliness, it cleans itself, how many before me to-night could make such a piece, a triumph in works of the dental art? I answer but few, indeed, as I am satisfied in my own mind that no progressive workman, and we all aim to be progressive, is ever completely satisfied with the operation, even when finished to the best of his ability.

As I am deeply interested in all that appertains to the advancement of our profession, may I be permitted to digress from my subject in a few remarks advocating the following suggestion: Dentistry would be much benefited if the profession would give more attention to the generous proposal of the "Army Medical Museum and Library," of Washington, D. C. This institution, which enjoys a world-wide reputation, has offered a room free for the exhibition of specimens of dental art. What a wide field of usefulness lies fallow! Why do not the dentists take advantage of this golden opportunity, and by sending some good specimens of our professional skill to this museum successfully demonstrate to the thousands of yearly visitors the value of dental hygiene as a branch of the healing art?

In elevating the standard of dentistry so high, and placing the title on a level with other learned professions, there is another thought that should be taken into consideration: should not every

candidate for the degree of D.D.S. possess not only a cultured mind, but a skilful hand in manipulation. Of what advantage is all this theory, if we fail in the performance? Why find the germs of caries, if we cannot destroy? Why teach pathology, if we have no therapeutic results? Therefore, though elevating the standard let us be consistent, not raise it on one side too suddenly, or the good old ship "Dentistry" may capsize with its unevenly balanced cargo.

It was one-sided for many long years, and encountered some adverse winds, but it now seems on fair sea, so let us trim the ship and sail with grace into the beautiful barbor of "Consistency," with "Theory" as our captain, "Practice" as first officer, and as an anchor "Peace and good will to all."

Abstracts and Translations.

SALUBROL, A SUBSTITUTE FOR IODOFORM.

BY PAUL DE TERRA, DENTIST, ZÜRICH, SWITZERLAND.

In surgery nowadays carbolic acid, corrosive sublimate, and iodoform are still predominant, and in dentistry these antiseptics, although not of equal importance, have likewise the preference. In the treatment of the teeth, with especial reference to the pulp, we require two principal specifics: one for the treatment of the pulp itself when it is to be preserved, and a second for the root-canals when the pulp has been destroyed. In both cases an antiseptic with corrosive action is thoroughly impracticable. Especially for the antiseptic treatment of roots, carbolic acid and mercuric chloride seem to me extremely dangerous, particularly if these powerful agents have not been used with the utmost caution, and, for example, they have penetrated into the alveolar process through the foramen apicale, through defective canal walls, or by a simple process of absorption. How many cases of pericementitis have been the consequence of this disastrous treatment with these agents, to say nothing of the great possibility of necrosis, and the consequent loss of the tooth or even of the entire alveolar process?

The only specific which we have heretofore been able to use in all cases of pulpitis and pericementitis, without danger to the deli-

cate tissues, is iodoform. The latter has, as is well known, no corrosive action, and is therefore an invaluable antiseptic, especially for the treatment of roots. But that iodoform, in spite of its antiseptic qualities, has no effect as a germicide has been established by the investigations of Miller and others, and, indeed, soon after the discovery of this agent, which at the time was regarded as making an epoch in antiseptic treatment, the inadequacy of iodoform was pointed out at the Medico-Chirurgical Society of London in 1882.

That, in spite of this, iodoform still holds the first place in general estimation is proved by the fact that it continues to be an important factor in the filling of roots, and that surgery is still seeking in vain for an equivalent which shall possess the desirable qualities for treating wounds by this excellent agent, and at the same time avoid its defects. Especially noteworthy among the latter are its penetrating odor, its incidental toxic effect, and its imperfect efficiency as an antiseptic.

By the repulsive odor of iodoform the use of this otherwise serviceable agent is considerably limited in practice, especially for us dentists. Accordingly, since its first production, different correctives have been suggested with a view to deodorizing the preparation (ether, oils, sassafras, Peru balsam, and particularly Cumarin), and, in addition to these, a substitute for iodoform has been devised in iodol. Aside from the fact that none of these admixtures materially improve the odor of iodoform, they have, in part at least, a tendency to diminish its antiseptic value, and even to make its use in surgery in this form almost impossible.

The second disadvantage of iodoform, its incidental toxic effect, is of more importance for medicine and surgery, for in dentistry there can generally be no question of any such danger of poisoning, since the quantity of iodoform employed at any one time is in reality too small. Nevertheless, it must not be forgotten that the action of this drug varies greatly with the patient. The most dangerous properties of iodoform depend upon the fact that iodine, which is its principal constituent, and which makes up ninety-six per cent. of the preparation, is often not thrown off from the organism for a considerable period, and in this way induces a much-dreaded cumulative effect. The urine of patients who have been treated with iodoform may show appropriate reaction for weeks without any fresh application of the drug.

In view of these three important defects of iodoform, it would seem that an antiseptic which, while similar to iodoform in all its

good qualities, is free from these disadvantages, and which at the same time possesses a greater antiseptic power, might not only prove a satisfactory substitute for iodoform, but might even be destined to supplant it in practice.

Such an antiseptic seems now to have been found. A Zürich chemist, Dr. Schuftan, some time ago produced a preparation which fully satisfies the above-mentioned conditions, and which has been placed upon the market under the name of salubrol by the Farbwerken, in Höchst, near Frankfurt-am-Main. The preparation is produced by the action of bromine upon methylbis-antipyrin, and its chemical composition corresponds approximately to that of a tetrabromide. The bromine in it is very loosely united, and this characteristic renders all attempts to recrystallize the compound unavailing. It must be remarked, however, that the preparation itself is quite stable, and that it is only when in contact with organic substances that it gradually gives off a part of its bromine. It is probable that the efficiency of salubrol as a germicide may be traced to this very circumstance, for the antiseptic property of iodoform also is explained by the fact that the iodine contained in it belongs to the halogen group, all the members of which have a strong affinity for hydrogen, so that the liberated halogen unites with the hydrogen of water contained in the tissues, while the oxygen thus set free oxidizes the septic mass.

Salubrol is an extremely fine powder of a light (sulphur) yellow tint, which in taste and smell suggests the pharmacy; it is insoluble in ether and in water, but easily soluble in alcohol and chloroform. In water, and especially in glycerin, salubrol remains intimately suspended for a long time, so that it is very well adapted for injections and pastes. In addition to being free from offensive odor, salubrol has the still more important advantage over iodoform that it is not poisonous. This fact has been demonstrated by repeated tests made with animals, and in the different hospitals and dermatological clinics of Germany and Switzerland, by its use in the private practice of many specialists, and by the very conscientious experiments of Dr. Silber, in Breslau.[1] Moreover, when we consider the chemical composition of salubrol it is obvious that a toxic effect on the part of this drug would seem to be precluded, for bromine, in contrast to iodine, is not poisonous in any of its com-

[1] *Cf.*, Berliner klinische Wochenschrift, 1896: Salubrol, ein neues antiseptisches Streupulver, von Dr. M. Silber, bish. Assistenzarzt an der kgl. Haupt-Klinik und im Fränkel'schen Hospital in Breslau.

pounds, and has therefore found very extended use as a therapeutic agent; and, although it cannot be denied that its continuous use for any great length of time seems undesirable by reason of bromine exanthema, nevertheless this incidental ill-effect is not to be compared with the serious and frequently alarming toxic phenomena which, as already mentioned, are liable to manifest themselves after the most moderate applications of iodoform.

The third advantage of salubrol is its considerable antiseptic power,—its efficiency as a germicide. Although, both in surgery and in dentistry, aseptic methods are aimed at so far as is practicable, yet in certain purulent septic processes it is sometimes impossible to avoid antiseptic treatment, and many operations require antisepsis, because it is not always practicable to keep the field of operation clear. Without entering in detail into Silber's bacteriological experiments,—for this I refer the reader to the above-mentioned treatise,—I must state briefly that his attempts at culture extended to five different species,—bacillus prodigiosus, pyocyaneus, tetragenus, staphylococcus, and anthrax. All these experiments render it sufficiently clear that salubrol has pronounced power as a germicide. Iodoform checks the growth of the bacteria, but does not kill them. Cultures that have been sprinkled with iodoform do not, it is true, continue to thrive, but when freed from the antiseptic and transferred to a fresh culture medium they resume growth. Salubrol, on the contrary, not only checks the growth of developing bacteria, but even kills off such cultures as are already well advanced.

Having had my attention called to these favorable experiments with salubrol, I began to test it in my own practice. I received a quantity of salubrol for experimental purposes from the manufacturers in Höchst, and I have been using this preparation for about two months, with an average of twenty cases daily. Without making a detailed report of the separate cases, I can affirm that I have made use of salubrol with the very best results wherever I was formerly accustomed to employ iodoform. To judge by my practical tests,—I did not have time for bacteriological investigations,—salubrol is in no respect inferior to iodoform; and after the experiments that I made with salubrol paste in cavities and root-canals that had not been thoroughly cleansed, allowing the paste to lie under a cap of gutta-percha for from three days to two weeks, I can readily understand that the new antiseptic must have a radical effect as a germicide, for otherwise pericementitis must have been the consequence in a majority of

these tests. I have not been able, unfortunately, to obtain cases of pyorrhœa alveolaris for treatment during the last few months, otherwise I should have been glad to observe the action of salubrol in these cases also. Those treated by me with salubrol included pulpitis, the capping of pulps, the amputation of the pulp, the treatment of roots in all stages of inflammation, and root fillings. I was also able to establish satisfactorily the alleged power of salubrol as a styptic in a case of hemorrhage after the extraction of a lower second molar. The patient in this case, anæmic and hæmatophilic, had suffered from hemorrhage for days after every extraction. Accordingly, soon after the removal of the tooth I tamponed both alveoli with cotton saturated with salubrol, and was very agreeably surprised to find that the bleeding ceased at once and did not recur. It may readily be admitted that chance often played its part in my experiments; nevertheless, it seems to me, in view of the number of these tests, and in spite of the relatively short period of investigation (two months), that salubrol possesses antiseptic qualities in a high degree. I even believe that this agent, which seems to be in no way inferior to iodoform, but even surpasses the latter in value, and is, above all, free from its disagreeable properties, may be better adapted than any other to exclude iodoform entirely from the pharmacopœia of medicine and dentistry.

For practical use I have prepared salubrol in the following forms: as a paste of salubrol and arsenic, as a paste of salubrol and glycerin, and as a solution in alcohol, and also in chloroform. For purposes of injection I always prepare fresh liquid (aqua dest. 50, salubrol 5) by mixing the powder with a little water in a porcelain mortar, and then adding what water remains.

The paste of salubrol and arsenic (ac. arsen., 3; salubrol, cocaine, āā 1; ac. carbol., q. s. ut fiat pasta spissa) I consider very effective.

The paste of salubrol and glycerin is made by mixing the powder thoroughly with glycerin in a mortar, without further additions. I consider even the admixture of oxide of zinc for the capping of pulps as purposeless; the paste can be given more or less consistency as desired by the appropriate additions of salubrol powder. This paste keeps excellently in a closed glass; only it is necessary to stir it daily, as the salubrol in time rises to the surface. We see, therefore, that salubrol paste has the advantage over iodoform paste that it does not, like the latter, require further additions of the powder, which impair the action of the prepara-

tion,—*e.g.*, of the caolin or oxide of zinc used as a vehicle. The thick paste of salubrol always remains soft, and is therefore especially adapted to the capping of pulps and the filling of root-canals. In the case of decapitated pulps the necessary quantity of paste may be fixed on the desired spot with ease and certainty, and will remain there even if it should come in contact with saliva, as the preparation has no affinity for water. That salubrol remains permanently soft is obviously also an advantage as compared with the so called cement pastes, for these last never serve the purposes of an antiseptic covering. Just because they gradually harden, they lose all antiseptic power. Only a covering that will remain at all times soft or even fluid is capable of protecting the pulp tissues or the remains of the pulp itself from further decay, and thus of acting permanently as an antiseptic mass.

The solutions of salubrol in alcohol and chloroform (saturated, and, so far as possible, always freshly prepared) serve chiefly to cleanse and dry the cavity before the salubrol paste is introduced. They are greatly superior to solutions of carbolic acid in that they have no eroding effect upon the adjoining mucous membranes. For this reason it is possible literally to flood a cavity with the alcoholic solution, or a root-canal with the chloroform solution, without having to apprehend any danger to the soft parts of the mouth, even if the patient should swallow some of the fluid. I prefer to use the solution of salubrol in chloroform for root-canals, both because chloroform will dissolve a larger quantity of the powder, and also because by the more rapid evaporation of this solvent (which may be promoted by blowing in warm air) the salubrol remains finely and evenly distributed on the walls of the canal.

My procedure in filling canals with the aid of salubrol is very simple. After having made a funnel-shaped enlargement of the orifice of the canal I first apply, in gangrenous or putrid cases, a small piece of caustic potash, and push this up gradually with a fine canal-probe as far as the foramen apicale. When the contents of the canal have been saponified, the entire canal is cleansed by means of a Pravaz syringe and subsequent thorough irrigation with lukewarm water; then with a flexible canal-drill, and without exerting any pressure, I enlarge the entire canal as far as the foramen, and in some cases even perforate the latter when there is suppuration or necrosis at the apex of the root. The canal is best dried by means of the chloroform solution of salubrol, introduced repeatedly on closely rolled spirals of cotton. After this the paste of salubrol and glycerin is gradually pumped in, until the canal is

half full. The cavity is then closed with pink gutta-percha, and is left for several days, in some cases even longer, to give time for any reaction that may set in. Not until then is the final process of filling undertaken, in which the lower third of the canal is always left filled with as thick a paste of salubrol and glycerin as may be. The rest of the canal is then finished with Hill's stopping, or covered with a metal cap if the case is one for crown- and bridge-work. This metal cap, which is intended to receive the corresponding metal pin, is to be fastened down with phosphate cement, without allowing the cement to displace the salubrol paste, the latter, of course, being destined exclusively to close the foramen apicale.

EUCAINE HYDROCHLORATE, A NEW LOCAL ANÆSTHETIC.[1]

BY DR. GAETANO VINCI, MESSINA, SICILY.

Dr. Vinci has experimented with the preparation in the laboratory of Professor Liebreich, starting with the proposition that from its chemical composition it ought to show properties similar to those of cocaine. The new compound differs from cocalin in that a methyl group is substituted in it for a hydrogen atom which is formed by the action of ammonia upon acetone. The more convenient name of eucaine has been adopted in place of its chemical one of methyl-benzoyl-tetramethyl-gamma-oxypiperidine-carbonic acid methylester.

Like cocaine, its free base is with difficulty soluble in water, and forms large shining crystals, melting at 104° to 105° C. (220° to 222° F.); with acids it forms neutral salts having the same action as the base itself. The muriate of eucaine crystallizes from a watery solution in permanent shiny plates or scales, which contain one molecule of water of crystallization and have a formula of $C_{19}H_{27}NO_4HClH_2O$. They are soluble to the extent of six per cent. in water at the ordinary temperature. From methyl alcohol the hydrochlorate of eucaine crystallizes in shining prisms containing two molecules of methyl alcohol. Both forms of hydrochloric acid salt were investigated.

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[1] Extract from a paper read at the session of the Hufeland'sche Gesellschaft, Berlin, April 16, 1896.

Local Action.—A two- to five-per-cent. solution of eucaine instilled into the eye of an animal, as a dog or rabbit, caused complete local anæsthesia in from one to three minutes. It began in the cornea, and spread from thence to the conjunctiva, and lasted on an average from ten to twenty minutes. It was readily prolonged by repeating the dose. It was always accompanied by a slight hyperæmia, and slight irritation of the palpebral conjunctiva. This was only the case with the methyl alcohol form; the watery solution caused at most a very slight hyperæmia. The pupil was not dilated, and reacted well to light. Injected under the skin eucaine caused complete anæsthesia of the part, so that the reflex could not be evoked even with a needle. A similar complete local anæsthesia of the mucosæ was affected when a eucaine solution was painted over it.

The general action of the drug, both in cold- and warm-blooded animals, consisted in a marked excitation of the entire central nervous system, followed by paralysis in toxic doses going on to death. Even two-thousandths gramme (one thirty-third grain) caused irritability, heightened reflexes, inco-ordination, and finally general paralysis in the animals experimented with. Small doses administered to mice and rabbits caused increased reflex excitability, and increased but weakened respiratory movements. Medium doses of two-hundredths to three-hundredths gramme (one-third to one-half grain) per kilogramme (thirty-five ounces) caused repeated tonic and clonic convulsions. The animals lay senseless on their sides, with dyspnœa, opisthotonos, and finally paresis of the posterior limbs. These phenomena were most marked when large toxic doses of ten-hundredths to fifteen-hundredths gramme (one and a half to two and a quarter grains) per kilogramme (thirty-five ounces) were administered; the convulsions returned continuously, and affected all the muscles of the body. The animals finally died when the paralysis reached the respiratory muscles.

When the dose was not a fatal one, the convulsions gradually ceased, the increased reflex excitability disappeared, and the paresis of the hind limbs slowly improved.

The effect of eucaine on the central nervous system is therefore at first excitant, and later, in toxic doses, paralyzing. The paralysis is a central one, for if the sciatic nerve of a frog poisoned with eucaine is exposed, and its peripheral end irritated with the induced current, the limb reacts in a normal manner.

As regards its action on the heart and the blood-vessels, the subcutaneous and intravenous injection of small and medium doses

slows it on the average from twenty to thirty beats per minute, but without otherwise modifying the beats, or increasing the blood-pressure. This effect on the pulse is caused by the excitation of the central vagus; for section of the vagi causes an immediate increase of the pulse to the normal and above it, together with an increase of the blood-pressure. Death occurs from paralysis of the respiratory centres, for the heart continues to beat for some time thereafter.

In all these points eucaine is similar physiologically to cocaine. Yet there are some important differences which must not be forgotten. In the first place eucaine is *less poisonous than cocaine.* Whilst the animals treated with eucaine survived, other animals injected with the same doses of cocaine died. The pulse with eucaine is always decreased in frequency; with cocaine there is a primary acceleration. As regards their local action, the commencement of the anæsthesia, its duration and intensity, there is no difference between the two substances. But eucaine causes no ischæmia; on the contrary, vascular dilatation occurs. A further difference is that the pupils are not affected; mydriasis does not occur, and the reaction to light remains normal.

The clinical experimentation was done in Professor Schweigger's Ophthalmological Department of the University Clinic at Berlin, and on all the various maladies of the eye,—acute and chronic inflammation of the cornea and conjunctiva, dacryocystitis, operative procedures, removal of foreign bodies from the cornea, cauterizations, etc. Both preparations were employed in two-per-cent. solution and compared with similar cocaine applications. They showed that the two drugs were of like value in the human subject also, as regards the rapidity, duration, and intensity of the anæsthesia. This is complete, progresses from the cornea to the conjunctiva, appears from two to five minutes after the instillation, and lasts from ten to fifteen minutes. There is some hyperæmia, and a slight irritation of the palpebral conjunctivæ. Some patients complained of a slight transitory burning, but only when the methyl alcohol preparation was used. The watery solution caused no by-effects save a slight, hardly noticeable hyperæmia. It is, therefore, the solution to be preferred for practical use.

Another difference of great importance is that eucaine does not like cocaine, induce mydriasis and paralysis of accommodation. The pupil is not dilated at all, and reacts well to light; the accommodation remains normal.

This is a property of the greatest importance in practical oph-

thalmology, and favors the employment of eucaine in cases in which a production of ischæmia with the anæsthesia is not required. In violent inflammatory conditions of the eye, eucaine also promptly produces anæsthesia, but the ischæmic action fails, and consequently for such cases cocaine will have the preference. Both drugs diminish the intra-ocular pressure about equally.

Its last advantage is that *the eucaine solutions are permanent and do not, like those of cocaine, decompose when kept.* Cocaine solutions are decomposed when they are boiled for the purpose of sterilization, thereby losing their property as a local anæsthetic; and the decomposition products have an irritant effect if such a solution is employed. Solutions of eucaine on the other hand do not suffer decomposition even when boiled for a long time.

Eucaine has thus been shown by experimentation on animals and on the human subject, to have very marked local anæsthetic properties which render it worthy of being placed by the side of cocaine in ophthalmological practice. *It has the advantage over the latter in that it has no effect on the pupil or on accommodation; that it is less poisonous than is cocaine; and that, whilst the absence of ischæmic effects render it less suitable in certain cases, in others its slight hyperæmic action will be distinctly advantageous.*

Sanitätsrath Dr. Reichert, specialist for diseases of the nose, throat, and ears, at Berlin, has demonstrated the therapeutic value of eucaine in diseases of the throat and naso-pharynx. He has shown that not only does it cause *marked local anæsthesia, but that it is absolutely harmless in medicinal doses.* Of especial importance is the fact that he found that *it does not affect the heart,* which has often been found to be the case with cocaine, more especially in neurotic and weakly individuals. In diseases of the nasal mucosæ Dr. Reichert found that eucaine alone, without any other application, sufficed to effect a cure in many cases.

Dr. C. L. Schleich, of Berlin, certifies as follows:

For the purpose of comparing it with cocaine I employed eucaine on the mucous membrane in one to five-per-cent. solutions, and in my method of infiltration anæsthesia, in one to two per cent. solutions. *There is not the slightest doubt that it is just as efficacious as cocaine in causing anæsthesia of the mucous membranes.* It depresses the superficial sensitiveness to about the same degree; in fact it was somewhat stronger when used in the same doses. It does not cause the marked ischæmia that cocaine does. *I have not met with a single case of poisoning;* there was not even any alteration in the pulse frequency or tension. After using a dilute eu-

caine solution for the purpose of anæsthetic œdema in some twenty cases, it was very forcibly impressed upon me *that eucaine was less poisonous than cocaine.* Experiments made upon my own person showed that the anæsthesia of the wheals was complete, though the infiltration was not quite so painless as with cocaine. Judging by my experience, I am of opinion that for pure contact anæsthesia, as by painting the solution over the mucosæ, it should replace cocaine.

In dental practice we are able to report that Professor Warnekros, instructor of dentistry at the University of Berlin, has admitted that *eucaine is preferable to cocaine inasmuch as the anæsthesia is very prompt, and an increase in the rapidity of the cardiac pulsations has never been observed.—Deutsche medicinal Zeitung*, No. 34, April 27, 1896.

EUCAINE HYDROCHLORATE.

BY H. KIESEL, DENTIST, BERLIN, GERMANY.

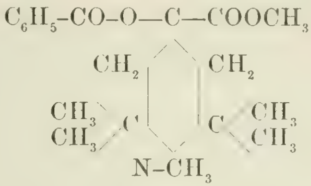
WHEN one talks or writes of a new local anæsthetic nowadays, it is met with a dubious shake of the head, and either its failure or the report of toxic by-effects that rob it of all its value is awaited. For the list of such remedies is by no means a small one; yet there is none that is always applicable or successful.

Once it was thought that cocaine deserved its place at the head of the list of the local anæsthetics, and it received an enthusiastic welcome. But soon its too frequently severe toxic effects were learned; it was seen that its solutions readily decomposed and, above all, its non-reliability was recognized, since in some cases even large doses were found to have little or no effect, and in other instances the injection of small amounts would be followed by excessive reaction. The author has himself had the experience of an injection of five-hundredths gramme of cocaine (three-fourths grain) causing so violent a reaction that the patient remained in an apparently lifeless condition for an hour and a half. The pulse and the respiration seemed to stop; amyl nitrite was useless, and the patient's life was saved only by the vigorous use of artificial respiration. Palpitation, feelings of apprehension, tiredness, apathy lasting for hours, and even vomiting are not unusual effects of cocaine injections.

In consequence of all this, cocaine was soon almost banished as a means of local anæsthesia from our armamentarium. A substitute

for it, on which I am about to report here, will indeed be welcome; I refer to the recently introduced remedy known as eucaine.

Like cocaine, eucaine is the methylester of a benzoylated oxypiperidine carbonic acid, Its constitution is represented by the formula:



The hydrochlorate of eucaine, which is to replace the hydrochlorate of cocaine, has the following chemical constitution: C_{19}-$H_{27}NO_4HCl$.

From a chemical point of view eucaine has an advantage over cocaine in that it is not decomposed by boiling with water; cocaine under similar circumstances dividing into benzoylecgonine and methyl alcohol, and losing its efficacy as a local anæsthetic.

Eucaine, like cocaine, is used in the form of an injection. At first I employed a solution of one to fifteen of sterilized water, using, according to the nature of the operation and the size of the field to be covered, from one to two syringefuls. But I soon found that higher percentages might be employed. I then prepared a solution of one to six and a half, and used that thenceforth in my experiments. Their results were entirely satisfactory.

As regards the advantages of eucaine over cocaine, I note as follows:

1. The heart is in no way influenced by it. In fact I noticed that in very nervous patients, whose pulse had risen to 120 and 130 before the operation, the heart beats became normal and regular very soon after the injection.

2. The anæsthesia is more extensive in area and lasts longer than does that of cocaine. In some of my experiments the analgesia extended even to the muscles. In one case, where an injection was given over the first incisor, there occurred a paralysis of the ala nasi and anæsthesia of the nasal mucous membrane on the right side. The patient declared that her nose felt as if it was stopped up, but the sense of smell was not interfered with.

3. As much as two grammes (thirty grains) of eucaine can be injected without trouble; whilst of cocaine the similarly safe dose

is only one-hundredth gramme (one-sixth grain). Thus of a solution of one to six and a half, about fifteen per cent., twelve syringefuls would constitute a maximum dose. Half that quantity would, however, under favorable circumstances be sufficient to painlessly extract all the teeth from a mouth.

4. Solutions of one to six and a half in sterilized water are permanent at the ordinary temperature of the room. They remain clear without the addition of carbolic or salicylic acids and do not become flocculent as cocaine does.

5. Finally, I am informed that it is intended to put eucaine on the market at a price considerably less than that of cocaine.

When we consider the facility of application of eucaine, the certainty of its action, and, above all, its great advantage in the absence of noxious by-effects, it is evident that it will soon become one of our most favored anæsthetic remedies.

I have known the preparation since November, 1895, and have used it exclusively. My results have been such that I have cast aside both ethyl chloride and ethyl bromide entirely.

Who among us has not experienced the excitation and vomiting that so frequently occur in operations done under the bromide of ethyl narcosis? Who among us has not seen ethyl chloride cause excessive secretion of saliva, when extractions of the second and third molars are undertaken? Who has not met cases in which the stream of chloride of ethyl was hindered by the soft parts from reaching the second, not to speak of the third molar? All these unpleasant things may be avoided by the use of eucaine, without in any way interfering with the results that are aimed at.

I use a Pravaz hypodermic syringe and inject the solution about one centimetre in front of the tooth to be extracted. In this way it is rarely difficult to do a painless extraction even of the third molar. In one case, in which on account of anchylosis the syringe could not be advanced far enough—the third lower molar of the left side was to be extracted—I injected from without, in the direction of the diseased tooth. Four or five minutes after the injection the anæsthesia was so great that the extraction could be effected without pain. If, as sometimes does happen, the effect of the drug is not at once apparent, or is not sufficiently marked, it suffices to give a half, or in rare cases a full syringeful additional and both patient and operator will be satisfied with the result. In none of my cases did any of my patients show any disturbance of the system at large.

In a few cases there were swellings of the cheek after the injec-

tion, though the solution and the disinfection of the syringe could not be criticised. Thereafter, I cleaned the mucosa thoroughly with cotton soaked in carbolic solution before making the puncture, and I have seen no more of them.

I shall now mention two cases in which I used eucaine which are characteristic, and will enable us to judge of its great applicability in dental practice.

The first was the first one in which I used the drug. It was the extraction of the root of the left upper canine, in consequence of a bet, the condition of which was that the extraction should be done without narcosis. With eucaine it was done painlessly and satisfactorily.

The second case was that of a theological student, who had undergone chloroform narcosis fifteen times in half a year for surgical reasons. I knew that the patient had been operated on under chloroform, but that the narcoses had been so many was purposely concealed from me. The patient had a severe toothache, the cause of which he thought was the second superior molar of the left side, though the second inferior molar of the same side was also painful. The patient could not be convinced of his error, and demanded extraction of the latter under narcosis. To this I finally consented, as the second left inferior molar was already lost. The patient was extremely timid and believed that only very large quantities of ethyl bromide could procure him absolute painlessnesss. He consequently resisted the ethyl bromide action to the utmost. Narcosis occurred only after the administration of twenty-five grammes (five-sixths ounce) of ethyl bromide. I then attempted to extract the tooth; but the patient awoke too early, and the tooth was fractured. In the evening the patient came back with violent pain and demanded that I extract the root. His condition was such that I could not think of another ethyl bromide narcotization. But a syringeful and a half of eucaine sufficed. The next day the patient had become convinced that my opinion was right, and demanded the extraction of the second left superior molar. Again he was given an injection of one and a half syringefuls and again there was the same good effect. The patient assured me that he had felt nothing at all. These good results in extraction, together with similar ones in other operative procedures, induced me to substitute eucaine for the cocaine in my arsenical paste. Here also its action was an excellent one. But seldom were there complaints of slight pain after the introduction of arsenic with eucaine.

Such are my experiences, and they give me the right to ask my

colleagues to replace cocaine with eucaine in all cases so as to control my experiments and to extend the usefulness of the drug.

Eucaine is a valuable enrichment of our armamentarium; and will be at least a very dangerous rival to cocaine, as soon as it is better known.—Translated from the *Zahnärztliche Rundschau*, Berlin, April 5, 1896.

Since the publication of the report by dentist Kiesel, it has been found that solutions of eucaine hydrochlorate in the proportion of one part to six and a half parts of sterilized water will, after awhile, separate some of the eucaine. To prepare permanent solutions one part of eucaine should be dissolved in ten parts of sterilized water. Such solutions remain perfectly clear for an indefinite period of time.

Reports of Society Meetings.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A MEETING of the Institute was held at the residence of Dr. C. W. Meloney, No. 54 West Forty-eighth Street, New York, Tuesday evening, June 2, 1896, Dr. Benjamin Lord, President, in the chair.

The minutes of the previous meeting were read and approved.

Upon the call for communications from committees, Dr. Bogue, chairman of the Committee on Operative Dentistry, responded.

Dr. E. A. Bogue.—If the President will permit me, I would like to ask Dr. McNaughton to read his part of the report.

Dr. S. H. McNaughton.—The preparation with which I have had some success as an obtundent is composed of equal parts of cocaine and thymol, made by heating the two in a test-tube, the thymol being melted, and this in turn dissolved the cocaine; or it may be made by grinding the two together, a thick syrupy fluid being the result. For sensitive dentine, I use it by placing a piece of asbestos paper saturated with it in the cavity and over as broad a surface as possible, covering this with zinc phosphate, and allowing it to remain two or three days or more.

Harlan and others have shown that medicaments placed in the pulp-canal will traverse entirely through the dentine and cemen-

tum; that some substances do enter the living dentine is proved by the discoloration produced by amalgam fillings, by nicotine, by cannabis indica; it seems more than likely that arsenous acid is carried into the dentine by the living matter of the tooth. We often observe, just as the rubber dam is removed from teeth, that the teeth most thoroughly dried out by hot air have a lighter or whiter appearance; especially is this the case if an oil has been used to saturate the dentine. After a time the natural color returns. There has evidently been some change in the amount of moisture in the tooth, so that the theory of absorption of cocaine by dentine may not be a far-fetched one, especially as it seems to be conceded that by cataphoresis cocaine may be forced into the tissues.

Some cases have seemed to prove that the compound cocaine and thymol is really an obtundent. I shall only give two or three.

Case I.—Mrs. P.—Cavity in distal surface of superior bicuspid; began to prepare for filling, but finding it exceedingly sensitive, applied the cocaine mixture; she returned two or three days later, and there was almost no pain in thoroughly preparing the cavity. She said it was worth an extra trip from Yonkers.

Case II.—I had partially prepared a very sensitive cavity in the lateral incisor when a cavity was discovered in the central, and as my next patient had already come, I placed in the cavity in the lateral some of the cocaine and thymol covered with zinc-phosphate and made an appointment for three days later. At this sitting, when the preparation of the cavity in the lateral was completed, he asked if that was the same tooth that had been so sensitive the previous day, and, on being told that it was, said that nearly all tenderness had disappeared. He did not know of my using any obtundent.

Case III.—Young lady, aged twenty. I attempted to prepare approximal cavities in bicuspid and molar, but found both to be so extremely sensitive that I could do almost nothing. An application of the cocaine and thymol was made and covered with gutta-percha, and these were not again operated upon for over two weeks. The sensitiveness was somewhat lessened, and I was enabled to prepare both cavities to my satisfaction; but of all the cases I have tried where the preparation has been in two days or more, I consider this the nearest to failure. I think, perhaps, that the cocaine had leaked from under the filling, or that possibly enough had not been used, and perhaps too much time had elapsed.

I relate these cases believing the cocaine and thymol compound to be of assistance. The addition of potash to devitalizing mixture hastens its action, but it needs to be used with great caution.

Some of the other uses to which the cocaine and thymol may be put are to saturate pulp-canals, and to anæsthetize the tissue beyond the foramen preparatory to filling a root, to protect sensitive dentine while operating, as a vehicle for arsenous acid, etc.

Dr. E. A. Bogue.—Your Committee on Operative Dentistry begs to call attention to some of the recent utterances in regard to cataphoresis, both for local anæsthesia and for the bleaching of discolored teeth, and to give the results of a few experiments with the volt-selector, furnished by the Electro-Therapeutic Company.

It must be borne in mind that the most sensitive cavities with which we have to deal are those at or near the margin of the gum, or along the line of demarcation between the enamel and the dentine. When that line shall have been passed, the sensitiveness in any given tooth diminishes. The most difficult cavities to excavate and those most in need of obtundents are those between the teeth, and this is where cataphoresis is always difficult to apply, and most ineffective, if applied, so that it has been impossible for the writer to utilize it to advantage in this class of cases, excepting in readily accessible cavities in incisor teeth.

In those neglected cavities where, as Dr. Morton said, "the leathery substance at the bottom of the cavity can be peeled up, oftentimes exposing a sensitive zone," this mode of cataphoric obtunding is easily applicable. But the peeling up process (again according to Dr. Morton), even after the cocaine has been driven in electrically, gives so much pain that the writer wishes it might have been done before applying cataphoresis.

Neglectful patients are not generally the over-sensitive variety, but those who make immediate application for relief in case of any known defect in their teeth are the ones who are delicate and sensitive to the last degree, and who most need all the relief that can be procured. For that class of patients cataphoresis seems of little value.

It has another drawback that was strongly insisted upon by Dr. Morton at a recent Odontological Society meeting, and the writer cannot do better than to emphasize his warning. He said in substance, "It is astonishing how sensitive the nerves of a tooth are to even the slightest electric current; even one-half a volt is acutely felt, and a single cell of the Leclanché battery causes pain." This is quite true, and it limits the application of the instrument to a comparatively small number of cases, and these are the ones that need it least. The writer will enumerate few of the cases in which he used the volt-selector.

Mrs. T., a lady of perhaps fifty-five years of age; so intolerant of pain that when she first presented herself for treatment, five years ago, she would not allow an explorer to be put against the neck of the tooth, or into the cavities, without flinching so much as to render an accurate examination impossible. At that time the cavities in her teeth were obtunded with hot air first, and that was followed by pure carbolic acid and cocaine.

In certain proximate cavities where hot air could not be introduced, after drying the cavities as well as possible, carbolic acid and cocaine were first used, and afterwards zinc chloride in crystals, allowing these crystals to deliquesce in the cavity. This process has given excellent results in a larger number of cases than anything else that the writer is acquainted with, and these two methods have been pursued by him during the last twelve or fifteen years.

The lady whose case is now being described refers to the process as "the hot air treatment." A few days since a twenty-per-cent. solution of cocaine was applied with the electric current. The patient reported that the tooth was slightly sensitive to the operation, but it took about twenty minutes with a very disagreeable sensation to accomplish the same results that had always been accomplished for her by the "hot air process," as she called it. The second time that the selector was used, she declared very positively that her preference was for "hot air," and the applications that went with it. As this declaration was made when a cavity was but partially prepared, it was finished by using carbolic acid and cocaine followed by chloride of zinc, which accomplished the desired result, the tooth being excavated without further pain.

D. D., a brave little boy, ten years old; left upper molar; approximate cavity; exceedingly sensitive; necessary to fill where the temporary tooth, which had just fallen, had left space enough to work in.

Application of hot air gave pain for the moment; applied the cocaine solution (twenty per cent.) with the volt-selector, and the boy complained at every turn of the regulator, every increase of voltage, however minute; not that he was being hurt especially, but that the sensation was so disagreeable as to make him cry out.

After nine minutes of current, during which the indicator went up to "six," the current was discontinued; sensitiveness was diminished for a slight depth at the margin between dentine and enamel, but before all the decay had been removed the boy was bitterly complaining of being hurt.

Finished by applying chloride of zinc in crystals, which soon gave the ability to finish the excavation.

Mrs. E. said that the electric current was far worse than the pain of the tooth; that it was a very disagreeable feeling, and made her arm lame for a long time afterwards; she also said that, as a general thing, after a tooth was filled she heard nothing more about it, but in this case, the tooth operated upon ached for a day or so afterwards.

Mrs. J. said the first time that the writer used the electric current there was an alleviation of sensitiveness, and the work was much more easily performed. The second time she said she did not see much difference between that and the old way of doing, but was willing to have whichever way the operator said was better.

Cataphoresis has been successfully tried in four cases of bleaching,—three central incisors and one lateral. The lateral was considerably discolored with a bluish tint, arising evidently from extravasated blood in the pulp-chamber, which extravasation caused the bursting of the blood-corpuscles and the dissemination of the hæmoglobin into the dentinal tubes. The diagnosis of this condition was very clear after the tooth had been opened, because about one-third or one-half of the pulp was found alive, the rest dead. The other three teeth were yellowish, one of them having abscessed and having the pulp-chamber full of pus when the drill struck it; the other two teeth were yellow through the effects of a blow received many years previously, which had evidently destroyed both pulps. These three central incisors were all nicely bleached in from twenty to thirty minutes, but the lateral took an hour and required a voltage of "37" of the volt-selector, producing an amount of heat that was very perceptible to the operator as well as the patient. A professional friend, who assisted at these operations, gave it as his opinion that he had himself produced equally good results in bleaching by the use of hot air for drying the cavities first, and then pyrozone, without the electric current. Now the reason of this partial success is not far to seek. When the electric current is passing through a portion of the living organism, it naturally encounters different degrees of conductivity on the part of the tissues through which it passes. When the positive electrode is placed inside the cavity of a tooth, which tooth is composed of dentine somewhat analogous to ivory, enamel, still more a non-conductor, and cementum, a bony structure, it cannot be supposed that the current will follow any but the lines of least resistance, and it cannot be supposed that the same result can be obtained

through a non-conducting substance that can be reached through nerve and muscle, or even through skin when moistened.

Dr. Morton, to whom the writer is indebted for his knowledge on this subject, says that he is profoundly ignorant of all strictly dental matters. Your committee would certainly not be so impolite as to contradict this assertion, especially in view of a little zone in one of the teeth which was bleached that for a long time resisted the bleaching agency. Why was this? It cannot, perhaps, be proved without more extended experiment, but it seems quite explicable upon the ground that the electric current was following out the line of least resistance, and so leaving certain dentinal tubuli that were off the direct line unaffected, until capillary attraction and osmosis eventually, after two or three days, did the work. Another local anæsthetic that does not seem to be very generally used among dentists, but nevertheless is of great value, is chloride of ethyl.

This substance has been more and more used in hospitals for the last six or seven years, in minor surgical operations, such as opening abscesses, amputation of fingers, and the removal of small growths, as well as for the extraction of teeth. Being put up in small glass tubes with brass caps over the orifice, no especial apparatus is required for its use. It evaporates so rapidly that the freezing-point is reached sometimes inside of two minutes, and anæsthesia generally in one minute if the surface is dry. What results may be reached in the near future with the help of the electric current we do not know, but up to the present the much-talked-of volt-selector must take its place as one of the many instrumentalities for local anæsthesia, and not pre-eminent for its safety or rapidity of action.

Dr. Brunton, of Leeds, recently sent the writer a little lamp in the wick of which is a coil of platinum wire to equalize the flame and prevent the lamp going out. A shaving an inch and a quarter long, cut from a platinum plate of No. 30 gauge, would answer very well, and could be attached to the wick of any lamp. It is rather efficient.

The attention of the chairman of this committee was called by Dr. Davenport to a method of banding teeth with gold, described in a paper by Dr. J. F. Adams and published in the *Digest* for January, 1896. Dr. Davenport seems to think that Dr. Adams's advice should be noticed by our members. The writer is pleased to say that eleven years ago a patient came into his office with a tooth banded in very much the same way by Dr. Allport, of Chicago, and

that tooth was in good condition a few weeks ago. The writer has had two other teeth bleached since this paper was written, both of which have been bleached without the volt-selector, and so far as can be seen the results attained have been as good as with the volt-selector. It took, however, a little more time to do it. Dr. J. G. Palmer bleached two central incisors in the mouth of an English lady, who was written to, inquiring about them, and the answer to that letter stated that her teeth were gradually turning black, and she was very much disheartened. With Dr. Palmer's permission the patient was invited to the office of the writer, and it was found that a point not larger than the puncture that a small pin would make in paper, where the gold showed through the enamel, exhibited a dark spot; for the rest of it, the bleaching which Dr. Palmer did for her was admirable and was staying well.

The President.—The report of the Committee on Operative Dentistry is now before the meeting for discussion.

Dr. Charles F. Allan.—In the light of my personal experience the past three or four weeks, the report of Dr. Bogue and the remarks of Dr. McNaughton just made seem to me like ancient history. Cataphoresis has come to stay. The Wheeler volt-selector, upon which the doctor's remarks have been mainly predicted, I have never used and cannot criticise, but with the machine which is before us to-night I know we have a means of controlling the sensitiveness of dentine, and many other sensitive conditions of the oral cavity, which is simply perfect,—that is, absolute. We have only one idiosyncrasy to combat, and that is the peculiar, varying quality of the teeth of the individual to conduct electricity, but the result is sure. It is not only that in the end we have complete anæsthesia, but it is a fact also that the process itself gives no pain.

I think the main trouble in using the machine seen here (the Van Woert cataphoric machine) has been that too generally the operator uses all of the cells. I find that is ordinarily not best; generally half of the cells will do the work.

There has been with me the radical difference in making complete anæsthesia in some cases of from six minutes to forty-five minutes, the latter case being one to which I think I referred at our last meeting; and I think I said also at that time that I was quite certain that when I had that patient again in my chair the time would be very much abridged. This has proved to be the case; a very deep coronal and proximate cavity in a bicuspid tooth was completely anæsthetized in fifteen minutes. The average time taken by me has certainly not been over twenty minutes, and I

would expect in the future to have it cut down to twelve or fifteen. By using judgment in the number of cells used, and of the way in which the current is turned on, no pain need be caused,—that is, no pain that the patient will complain of.

But there is another phase of the subject. I think every operator using this process will want to be very careful in the selection of his cases,—that is, cataphoresis should only be used where there is an urgent necessity for it. Complete anæsthesia loses to us the diagnostic indication of pain, which is almost invaluable in the preparation of so many cavities. In many ways pain is the very best diagnostic sign we have, and we should go but slowly in depriving ourselves of its valuable help. In all of my cases so far I have used a twenty-five-per-cent. solution of cocaine.

Dr. J. G. Palmer.—I think I can answer Dr. Allan's remarks concerning pyrozone, and make a few remarks referring to Dr. Bogue's. Dr. Van Woert was right regarding the conducting properties of twenty-five-per-cent. solution of pyrozone, the ethereal solution; but Dr. Morton has a way of making that solution an aqueous solution, by evaporating it, and the electric current will pass through it, and will do the work of bleaching quicker. I am very much in doubt as to its doing it any better than the ethereal solution used with warm air, but it will do it a great deal sooner. In the case which Dr. Bogue alluded to, of the English lady, he omitted to mention one fact, that in this tooth which she thought was darkening somewhat, there was a gold filling, not removed at the time of bleaching. All metals should be removed from the tooth to have the best results. The other tooth had no filling in it whatever. The discoloration she discovered was just a line of this gold filling that had been allowed to remain in the tooth. In the use of the selector I had better results than Dr. Bogue has had, probably because I selected easier and more accessible cavities. I stood by Dr. Bogue's chair, however, observing some of the experiments he has narrated, and I must confess that, despite my own success with the apparatus, he succeeded better with cocaine followed by zinc chloride, as described. I think Dr. Allan is well within bounds when he says the average would be about fifteen minutes. I have never been able to produce complete anæsthesia in less than seven minutes; if I remember, the majority of cases have been much more than that, and I am probably more convinced than Dr. Bogue that the selector will produce satisfactory results, but I have not been able to see it in any case, as Dr. Allan has, without producing pain. I doubt if I can do it without producing some pain

in the operation. I have not used this one which Dr. Allan has. I thought that the pain was due to the fact that I was trying to obtund the tooth in less time than fifteen minutes. In cases where I prolonged it to twenty minutes, turning up from fourteen to fifteen volts, there was decided success. Dr. Brown reported at a meeting in New Jersey that he had with a combination of fifteen per cent. cocaine with electrozone been able to produce complete anæsthesia in a minute and a half. In at least three cases of my own there was complaint that there was a great degree of soreness and irritation, like that which is consequent upon a prolonged operation and where the ligature has to be forced under the gum, running over two or three days.

The President.—All must feel this is a most interesting subject. Will Dr. Brown, of Elizabeth, give us his experience and views?

Dr. G. Carleton Brown.—While feeling the honor you have conferred upon me by asking me to give my experience in cataphoresis to the Institute, I feel that there is really little for me to say that will be of benefit, as the more experience I have the less I seem to know about the matter.

Some time ago I reported some cases that I considered interesting to the Central Dental Association of New Jersey, among them being one in which I secured complete insensibility in one minute and a half. As this case has been considerably talked about, I wish to state that there was no chance for a mistake, as my assistant always manages the instrument and keeps a careful record of the time consumed in all operations. The cavity was a very sensitive one, being situated in the anterior cervical surface of the left inferior cuspid, and extending slightly under the margin of the gum. A fifteen-per-cent. solution of cocaine in meditrina (electrozone) was used, being applied to the gum for one minute and to the tooth for one-half a minute. This was done to enable me to put on the clamp painlessly, which was accomplished; and, finding that the tooth did not respond to the pressure of the clamp, I decided to start excavating, and see how far the tooth was really obtunded. To my surprise, I was able to excavate the entire cavity without the slightest pain.

A few days after reporting this case I filled the corresponding cavity in the opposite tooth, and to secure the same anæsthesia I had to keep the current on for fifteen minutes. The conditions were apparently the same, and what caused the difference I am unable to say. But while we do meet with these occasional reverses, still the ratio of successful cases is increasing, as any one may

prove by keeping a careful record of all cases, failures as well as successes.

In regard to the average time required to produce the necessary insensibility, I think that Dr. Allan's fifteen minutes is more than is necessary; in most cases we are all apt, I think, to keep the current on longer than is really required, and time can often be saved by making several short applications rather than one long one. There is a tendency which I think should be carefully guarded against,—the inclination to use cataphoresis in a great many cases where it is unnecessary.

Dr. Bogue.—I would like to ask Dr. Brown whether in that minute and a half cataphoric case, using cocaine and ether and his cavity being at the margin of the gum, he took into account the fact that cocaine acts centrifugally and not centripetally, and acts to the peripheral extent of the nerves and not towards the centre.

Dr. Brown.—That might perhaps explain it; but, as I stated in my remarks, I applied the current first to the gum and afterwards to the tooth. I would not expect to get any effect on the tooth if I applied it to the tooth and the gum at the same time, as the whole electric force would, I think, pass through the gum.

The President.—Are there any further remarks to be made on this subject?

Dr. Milton F. Smith.—May I inquire what solution Drs. Palmer and Allan used; was it the aqueous solution?

Dr. Palmer.—I used the twenty-five-per-cent. aqueous solution.

Dr. Smith.—Have either used the cocaine with tincture of opium? My friend, Dr. Jas. P. Holder, says his best results have been secured with the solution of cocaine with tincture of opium instead of water. He also reported to me two cases in which he removed two pulps, and, he thought, painlessly. I am quite interested in that part of cataphoresis; it seems to me if we can do that, we certainly have made great progress in getting rid of arsenic, which some of us unfortunately are obliged to use.

The President.—It gives me pleasure to state that Professor Dawbarn has consented to speak for a few minutes this evening upon the subject of malignant growths. Will he kindly favor us now?

Dr. R. H. M. Dawbarn.—This subject of malignant growths is too extended for thorough treatment in a few minutes, and I do not know just what points you want to cover. What little I know about the matter might better come in clinical demonstration than

as a didactic lecture; this is more matter for a long, formal essay than for a five minutes talk. However, I have here a growth which illustrates a number of points which should be of practical value to all of us. This is an upper jaw taken from a young gentleman of this State. The case was sent to me by Dr. Howe of this Institute, and was a very interesting one in a number of ways. I think when you examine the growth you will say that its superficial manifestation would not have justified a diagnosis of any such degree of malignancy and size of tumor as actually existed; the antrum being entirely filled.

The President.—Dr. Dawbarn will be very glad to be questioned later on the matter that he proposes to bring before us.

Dr. Dawbarn.—This case presented the following history: About a year ago or a trifle less this young gentleman, aged twenty-five, had trouble with the second bicuspid of his upper jaw, which ached for a considerable time and ultimately was drawn by a dentist in the town where he lived, not far from New York. On close questioning, the patient remembered, when he finally came to me, a very interesting point,—namely, that he had noticed that the end of the fang of the extracted tooth was soft instead of being of the usual petrous character. The dentist had commented on this as being odd, but nothing was thought about the matter. The discomfort continued,—not suffering, simply a feeling of discomfort there. Because of that feeling of discomfort, and because of a slight fulness in the roof of the mouth that he had noticed in the last two or three months, he went to Dr. Howe, who felt sure there was a serious condition. I think he was of opinion that there was a tumor; and he sent him to me. I must say that when the young man presented himself to me there was little wrong to be observed. He was a rather full-faced individual, and such slight prominence above the alveolus as existed was not noticeable except on comparing the two sides. The roof of the mouth on that side was a trifle swollen in appearance. He had no cachexia, such as one frequently sees in the late stages of malignant disease. I made my diagnosis, as I have repeatedly done, partly by aid of a hypodermic needle. I ran the hypodermic needle into what should be solid bone, and it went straight through. I propose, if you will permit me, to demonstrate this with a pin. Now, it is self-evident to any of us that there should here be the densest kind of dense bone; but in this case the pin goes straight through, you see, and meets only about the resistance of ordinary cartilage; you see how little there is to show for it,—a little swelling here in the roof of the mouth

and again above the alveolus, over the antrum of Highmore, just behind the canine fossa. Thus far I had not made the diagnosis more than a presumptive one, as this softening might have been due, for instance, to osteoporosis accompanying an inflammatory condition there; but if there had been such a degree of osteitis with softening there would probably have been a previous clinical evidence of it, such as suppuration, an ulcerated root, or some other evidence of inflammatory bone lesion; and there was nothing of that kind. Then, too, if it had been merely a superficial softening from chronic inflammation of bone over the antrum, when the needle was pushed in through this very thin shell of bone I should have been able to move it with perfect ease; but instead of entering an air-space it was being pushed for the whole length of the needle into a solid mass; so it was evident that there was a large tumor there. Now, as to the variety of tumor, that was another matter. It might be a sarcoma, of several varieties; it might be odontoma, one of some half a dozen kinds; it might be a fibroma, an enchondroma, etc. As to odontoma, one small point is worth observing,—namely, that this man had a complete set of teeth, with none missing, except the one recently extracted. Now, in odontoma one regularly expects to miss a tooth; and pretty commonly the growth has developed from this tooth-follicle as a starting-point.

In order to make sure of the nature of the tumor, I cut from it a small piece, say, a centimetre long and a half centimetre in width, and sent it to a prominent pathologist, Dr. Ely, the president of the Pathological Society. He said it was a small spindle-celled sarcoma, and of an unusually malignant type. It is probably an epulis in origin, springing from the socket of the tooth that was extracted, and involving and softening the fang of that tooth, a microscopic examination of which would have enabled an early diagnosis to be reached. The growth filled the antrum simply because this happened to be the direction of least resistance. Now, of course, it became a matter for prompt operation. I determined to give him every chance I could of not having a recurrence; therefore I not only excised the entire upper jaw, but also completely excised the external carotid arteries on both sides, first tying in each instance all of its eight branches. Thereby the region formerly occupied by the growth becomes comparatively starved in blood-supply; and the fact seems of value in preventing return of the malignant growth.

The patient did well, and is now attending to his law practice,

wearing a prosthetic appliance made by a member of this Institute.

Let us now compare this case with a rather similar one, showing that you cannot make your diagnosis by softening only (though that is of great importance, and if a dentist meets with a case where he can pass a needle or pin into what should be hard bone, it is high time that a surgical consultation should be held). A dentist of a near-by city told that young gentleman that he didn't believe there was anything serious the matter, and advised him not to go to a surgeon. Softening alone is not sufficient to enable one to make a diagnosis of a malignant condition there. Another little history will be in order. Dr. R. M. Davenport, of this city, sent to me two or three weeks ago a young lady who for a long while had been troubled with an ulcerated tooth. Perhaps Dr. Davenport would like to give the history of that case.

Dr. R. M. Davenport.—The lady came to me about the last of January, troubled with a discharge from an opening over the right superior molar. The abscess discharged two or three times a day, and sometimes oftener. Although the fistulous opening was over the molar, direct entrance to the abscess was made through the second bicuspid, which had been syringed out for some time by a dentist in the country. He filled the tooth, but a recurrence of the discharge followed almost immediately. I removed the filling, syringing with hydrogen dioxide and dilute sulphuric acid, which came out through the fistulous opening, but the abscess did not seem to get any better. The last injection of sulphuric acid came out through the nose, showing unquestionably that the trouble had gone through into the antrum. I then took the patient to Dr. Dawbarn.

Dr. Dawbarn.—Then, Mr. President,—continuing the history of this case,—when I examined the young lady, I noticed, and she herself had observed, that the bone of the roof of the mouth and that over the antrum was distinctly softened, so much so that with the fingers on both spots a sense of fluctuation could be observed apparently transmitted by fluid in the antrum. It was obvious that chronic inflammatory change (osteoporosis) had led to this bone-softening. After the operation I found that a needle would as easily penetrate the bone as in the instance of the patient with sarcoma, just discussed.

It was not necessary to examine the antrum by electric light, prior to operation, to make sure whether or not it was involved, because in this case we were sure of it, Dr. Davenport having

observed upon at least one occasion that fluid which he injected into the root of the tooth most involved escaped from the nose on the same side.

About ten days ago I operated upon her, Drs. Davenport and Williamson assisting, using ether anæsthesia. I removed by gouge and chisel all bone obviously compromised, not by softening, but by suppurative involvement. The tooth-root, which had apparently been the starting-point of all the trouble, was chiselled across (and at a later date Dr. Davenport filled what little was left of the root), and the false passage into the antrum was freely enough enlarged to permit the entrance of the little finger. The antrum was irrigated with a saturated solution of boric acid and drained.

The subsequent history was uneventful. Healing was rapid. The drainage-opening is now nearly closed, and is no longer needed. Even in these ten days' time there is distinct resumption of rigidity by the adjacent bone which had formerly been softened.[1]

The President.—We trust that Dr. Dawbarn will not feel hurried, if he has any further remarks to make; if not, he surely is willing to be questioned.

Dr. Allan.—With a tumor present, is there any symptom or group of symptoms that would enable a physician to say to a patient, "If you don't submit to this treatment you will have cancer?"

Dr. Dawbarn.—No; several kinds of benign growths are capable at any time of taking on malignant characteristics. A tumor is not a safe thing to have, though at the time a patient comes to you it is purely a benign one. It may remain so, or else from unknown causes may, in several varieties, develop into carcinoma or sarcoma.

Dr. Allan.—I know a gentleman, about fifty years of age, who has little points of growth in the side of the lower jaw. Some of the points may be as big as the end of my little finger, and from that down to the size of a pea; he has had these all the time he has been a patient of mine, some ten or twelve years; they are growing slowly. As long as they are quiet and not troublesome, may they not as well be left alone?

Dr. Dawbarn.—I think it would be wise to have one of them excised and examined by a pathologist. Probably they are simple

[1] At the time this goes to press—a few weeks later—the bone is absolutely as rigid as ever.

osteomata and benign; but it is safest to make sure that no doubtful elements exist.

Dr. J. Morgan Howe.—I would like, if possible, to emphasize what Dr. Dawbarn has said, by calling attention to the necessity of our being familiar with the signs of disease, or at least suspicious of unfamiliar conditions, in order that we may not fall into the error that the gentleman did who examined this young man's mouth just before I did. The patient had been under the observation of a dentist and a physician for nearly six months, the second superior bicuspid having been removed last November. It was thought at the time that it was the cause of the tumor; but the swelling, he said, did not subside, and although he went back several times to both dentist and physician, he was assured up to the last that there was nothing serious the matter. I would like to say why I thought there was a suspicious and alarming condition. In the first place, the socket of the extracted tooth had not absorbed in the least; there was no shrinkage, and the cavity from which the root came was filled with a new growth of soft tissue. Next, I could easily and quickly exclude, as the cause of the tumor, all influence of the remaining teeth. They seemed to be in a normal condition, although loose; two molars and one bicuspid—the second having been removed—yielded to firm pressure in every direction without being sore, and the yielding was the giving of the socket to pressure, not looseness of the teeth *in* the socket. The swelling simulated an abscess in appearance, but was different from an abscess to the touch; pressure with the finger evidenced no pus, and there was an india-rubber-like elasticity, a resiliency different from the feeling of an abscessed tooth. Every dentist should have been suspicious of tumor in that locality, or connected with the teeth, not caused by the teeth, for if the dentist cannot find a cause in the teeth for the trouble, he should always be suspicious. The patient said the tumor had been lanced, but was not certain that any pus came away. I inserted a very thin bistoury into the tumor in three places, not expecting to get any discharge of pus, but to test the feeling of the yielding bony tissue. The bone seemed quite decalcified, so that I pierced it without any difficulty. This was another remarkable condition. There was one symptom lacking which I would have expected to find in a case of malignant disease. This young man had no pain of any serious character, but as I had known of many cancerous growths progressing to a considerable extent without causing great pain, I did not think that excluded the probability of this being a malignant growth. I would like, while I am on my feet, to refer

to a similar case that came under my observation several years ago. The young man had been under the observation of a prominent dentist in this city for some months, and also of a prominent surgeon, but they neither of them seemed to suspect there was anything serious the matter. The patient said they discussed over and over again whether they should take out one of his molar teeth or not. When I saw him, two molar teeth were loose, in a very similar way to the loosening in the case of Dr. Dawbarn's recent operation. I informed this patient that the case was serious, and it being in Dr. Garretson's lifetime, I persuaded him to go that afternoon to Philadelphia. He was operated upon the next day, and the results were similar to those in Dr. Dawbarn's case, in that it was necessary to remove the entire upper jaw of one side; the disease recurred in six months, and he died within a year.

The President.—Does Dr. R. M. Davenport know anything further of the history of his case?

Dr. Davenport.—I know very little: the first bicuspid was removed when the patient was about fourteen, and the pulp in the second bicuspid was devitalized and the tooth filled. About a year after it was filled this abscess formed,—about four years ago.

Dr. Wendell C. Phillips.—I have enjoyed listening to what Dr. Dawbarn has said this evening, having had considerable experience with malignant growths in the vicinity of the nose, and I am always interested in anything Dr. Dawbarn has to offer in connection with his work as a surgeon. I rise to ask two questions, and if the president will pardon a few suggestions I will be glad to offer them. Did Dr. Dawbarn make a careful examination of the nasal cavities as to whether the man had any polyps, and were there any eye symptoms? I have seen quite a number of cases of malignant growth of the superior maxillary bone, and have found that the insidious commencement of this especial form of malignant disease, which is quite different from what we ordinarily speak of as cancer, allows the disease to get very deep hold on the patient before any special notice has been taken of the growth itself. It seems that these cases of sarcoma rarely give any pain until the growth gets large enough to cause pressure on the nerve-trunks. A patient came to me and I found several polyps in the nose, and instead of its being polyp structure the microscopical report came back that it was a sarcoma. It was primarily a sarcoma of the antrum, but the growth had already extended into the other sinuses, which is very common for it to do, and there was breaking down of bony structures. Of course it was fatal. Dr. Dawbarn has very wisely

called our attention to-night to the necessity of taking precaution against recurrence. I know no form of cancer so liable to recurrence as sarcoma. I know no form that is any more surely fatal than is sarcoma. I don't mean to say that they all die, but nearly all do. Dr. Dawbarn has made every effort in this case to prevent recurrence, and the operation has certainly been very thorough. I am glad to hear Dr. Dawbarn speak so well of transillumination, which bears out my own experience. I recently heard a laryngologist say of it that it was good enough for a plaything, but he had never been able to discover that it is of any benefit. Had he known where to look for the light or dark spot, and known better the manipulation of the electrical appliances, he would have a little less trouble in getting favorable results. It was my pleasure to read the first paper upon this subject of transillumination before a dental society, in 1890, and the paper was published in the *Dental Cosmos* for January, 1891. The real secret of transillumination is to compare the influence of the reflected light in the two eyes and underneath them. As a rule, in antrum disease you will find darkness under the eye of the affected side, whereas upon the other side there will be a bright reflex.

The President.—Unless some gentleman has some question to ask Dr. Dawbarn——

Dr. Jackson.—Will Dr. Dawbarn kindly tell us whether sarcoma originates from the periosteum or from some other tissue?

Dr. Dawbarn.—In answer to the gentleman who last spoke, I think there can be no question in this case, since the bicuspid root had softened, that this thing began in the tooth itself, or more likely in its socket. It has a rather restricted basis, and it is incorporated with the bone in the roof of the mouth, but has no real pedicle. I think, as to prognosis, that the patient has a fair prospect; for the reason that this is a small fusiform-cell sarcoma, and that particular variety of sarcoma may be encapsuled; and if you will notice the specimen before you, this has a distinct capsule; therefore, instead of leaving me in doubt as to when I had removed all that was abnormal, I had a positive guide. I feel fairly confident that I removed all the abnormal growth. Regarding Dr. Howe's point, as to the question of pain, I find that malignant growths are apt to be painful; and as to this growth one would expect, having seen the tumor, that it would be painful, being so large. *A priori* it would puzzle any one, as it did Dr. Howe and myself, that there should be no pain. Doubtless it was the fact of development within the antrum, where it was not subject to pressure, that prevented

much suffering. It would be a very easy thing with the abundant space now here that I should cauterize it, should there be a recurrence, charring those diseased tissues, and doing it, if necessary, more than once. I think the results of the case will be quite good. Those cases in which recurrence is fatal are very apt to be ones in which the patients do not come back to the surgeon in time. As a mere prophecy, I have a great deal of hope that this man will entirely recover; he may have a recurrence, but even so, with prompt treatment I think the final result will be recovery.

Dr. Howe.—Mr. President, at the last meeting of the Institute, Dr. Van Woert made some remarks which seemed to me so incorrect and misleading that I should have replied to them at the time, but for the fact that the meeting was overcrowded with material, and I did not wish to take up the time that had been allotted to others. With your permission I will call attention to them now, and test the reliability of some of the statements. In regard to two substances, guaiacol and pyrozone,—five-per-cent. and twenty-five-per-cent. solutions,—he said they are "absolute non-conductors" of the electric current. I doubt it very much: I think there is no such thing as an absolute non-conductor; even those substances which are regarded as insulators have their resistivity recorded and tabulated; hard rubber and porcelain stand, I believe, at the head of the list as affording the greatest resistance; I do not know about liquids excepting water, its specific resistance is recorded. But on this point I wish to object to the use of the words "absolute non-conductor" as misleading. Then, speaking of bleaching with pyrozone, he said that "upon careful experiment you will find that pyrozone solutions, either five per cent. or twenty-five per cent., are absolute non-conductors, and the addition of the electric fluid does not hasten or facilitate the operation in the least." I have bleached teeth with a twenty-five-per-cent. solution of pyrozone by the aid of the electric current for over a year, and I have never had such good results without the electric current as I have had with it, and I believe from clinical experience that the electric current has helped very much. Dr. Van Woert said that pyrozone, both five- and twenty-five-per-cent. solutions, were "absolute non-conductors," and I understood that this was his reason for asserting it would not be cataphorically driven into the tooth. I will, with your permission, test it here for us all to see; it was proposed that I test it publicly, and I am very glad to do it. Now, gentlemen, Dr. Allan has poured some twenty-five-per-cent. pyrozone into a wide-mouthed bottle, and I have inserted two German-silver wires

through the cork into that solution; they stand in the liquid on opposite sides of the vial; I will just touch the wires that are in the solution with the electrodes; there are five cells connected now. The wires now are in the solution of twenty-five-per-cent. pyrozone, and you see that one milliampère is recorded by the milliampère meter. If the wires were larger, or if they were nearer together, or if they were inserted farther into the liquid, or if more cells were connected, in either case it would record more,—more current would pass. Now, another statement that was made was, "the conductibility of plain water with a pressure of thirty-one and one-half volts is just one-tenth of a millimetre to the half-drachm,—that is to say, when thirty-one and one-half volts are running through half a drachm of water the milliampère needle will show one-tenth of a milliampère." Now I don't know what Dr. Van Woert meant by plain water; I find that distilled water offers much greater resistance than tap water does; the reason, of course, we may suppose is that the chlorides, nitrites, etc., dissolved in our ordinary croton increase its conductivity. Distilled water has a very high resistance, but Dr. Van Woert said *plain water*, and which of the two he meant I do not know, but he said there would be *so much current* running through a *certain amount* of water. That is, I think, misleading, because the quantity of water that surrounds the electrodes does not at all influence the passage of the current; it depends upon the size of the electrodes, the distance that they are apart, and the extent of surface that is immersed in the liquid. That is easily shown. We will take this bottle of distilled water that I have here and put this cork with these wires in its opposite sides into it. On touching the electrodes to the wires we have two milliampères recorded, as you can see, the current passing through the distilled water. Now I will put the wires in the cork into tap water, and you will see the difference between the distilled water and the tap water. Please note where the needle stands; as I wanted to show that the amount of current does not depend on the amount of water, I put them now into this glass of water; you see that they are in about ten times as much water as before; the needle stands just the same, because the wires stand in just the same relation and are inserted to the same depth. The two electrodes might be in the river, and the current would be the same that it is in this glass, if their relations were the same and it were the same water. The points I wanted to call attention to are the use of the words "absolute non-conductor," the positive statement that the current would not pass through the

solutions of pyrozone, and the idea conveyed that the amount of liquid influenced the current. I might have shown as to the pyrozone that the three-per-cent. watery solution of pyrozone conducts about twice as well as distilled water, so that it appears that the peroxide of hydrogen increases the conductivity of water very much.

This is electrozone which Dr. Allan wants tested. It is a very good conductor; you will notice that the needle will get very much excited as soon as I touch the wires. We cut down the battery from thirty-one to five cells, and we still have more than the milameter can measure.

Dr. G. S. Allan.—That would explain the success Dr. Brown had using cocaine and ether in electrozone.

Dr. Howe.—If we are sure that conductibility is the thing to be desired.

Dr. G. S. Allan.—I think it probable that the conductibility of the bleaching agent employed will directly influence the results obtained.

Dr. Howe.—That remark of Dr. Allan's calls up to mind a thought that has come to me recently: that it may be we will find that the hydrochloride of eucaine, which is a new agent that has been tested abroad, and is made by Schering & Glatz, may be of service to us in producing anæsthesia of dentine: but I hope that electrozone may prove to be a help.

Dr. G. S. Allan.—And it would be necessary to use a weaker solution of cocaine in electrozone in order to obtain equal results.

Dr. Howe.—That may be, but still its conductive properties may be very different, and its action on dentine may be very different from what it is on soft tissue; all these things are matters for experiment rather than for arriving at conclusions by reasoning.

Adjourned.

S. E. Davenport, D.D.S., M.D.S.,
Editor The New York Institute of Stomatology.

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

A regular meeting of the Association was held on Monday evening, May 18, 1896, at 943 Broad Street, Newark, the President, Dr. Walter Woolsey, in the chair.

Dr. Sutphen.—I would call the attention of the members to the

proceedings of the annual meeting, which have been printed and are here for distribution.

Dr. Meeker.—We have on the table here this evening some copies of the "Dictionary of New Remedies," a very valuable thing for the dentist, which has been presented by Dr. Adams with the compliments of McKesson & Robbins.

Dr. Barlow.—Mr. President, the Executive Committee have to report that Dr. Barrett, who, as you know, disappointed us at the last meeting, will give us a lecture either in September or October. He has new slides prepared expressly for this exhibition, and Mr. Fiske, of New York, will provide the lights and show the slides.

Dr. Meeker.—Mr. President, I do not wish to interfere in any way with the progress of the meeting or the paper of the evening by Dr. Twilley, but he will excuse me if I speak for a minute of these subjects, because this is the last meeting until September. The New Jersey State Society meeting commences at Asbury Park on July 15. We have already received assurances of attendance from various sections throughout the country, and we think that this will be the largest exhibition the Society has had, even larger than that we had last year.

The President.—The next thing in order is the paper of the evening, by Dr. William Shaw Twilley, of Baltimore, entitled, "Dentistry, Practical and Theoretical."

(For Dr. Twilley's paper, see page 563.)

The President.—Gentlemen, the paper is now open for discussion. I will call upon Dr. Eaton to speak on this subject.

Dr. Eaton.—Mr. President, I do not know that I have anything of merit to advance in regard to the paper. I have had a theory for a long time—it is simply a theory—that the dentists of to-day should be the judges of the qualifications of the men who are to practise dentistry hereafter,—that is, that every man who anticipates studying dentistry should be required to serve some time in the office of a preceptor; and that preceptor, if he is an honest man, finding that a young man is not adapted to the practice of dentistry, would tell him so, kindly and candidly, and advise him to seek some other means of gaining a livelihood. To make a dentist, a man must have some special endowments; in addition to a good and active brain he must have a natural love of mechanics if he expects to succeed in dentistry; and that is the point I want to make, that his preceptor should be the judge of those qualifications.

Dr. J. Allen Osmun.—Mr. President, this is a subject in which I

have taken a great deal of interest, and I think some of you have heard my views on it before. I do not think I have the faculty of presenting the question quite so lucidly and gracefully as Dr. Twilley has done to-night; nevertheless, I endorse all his propositions heartily; and I am glad to see, from Dr. Eaton's suggested method of procedure, that he believes in probation. I believe that every young man who enters the dental ranks should be required to serve a time on trial. If he is found to be qualified, if he possesses the natural abilities, then promote him; otherwise turn him off in some other direction. I have claimed before, and all the succeeding years of experience have not changed my opinion, that you cannot make a dentist. Dentists cannot be made to order; they are born; the qualifications are given by the Master Workman, and the colleges, the private preceptors, and the examining boards simply train them to further usefulness in larger fields. I was glad to hear Dr. Twilley say that practice without theory is like faith without works,—dead. I believe the theoretical man is a weak man, and I regard the practical man without theory as equally weak. It is the union of the two, the theoretical and the practical, that makes the complete man. It is a mistake to develop one side of a man's nature at the expense of the other side.

I am glad this question has come up. I think that if the colleges are to be criticised at all they can be criticised on that particular side,—that they are elevating theory at the expense of practice. A college student having great ability as a mechanic, who does plate-work, and makes beautiful crowns, is unable to pass the examination in the theoretical branches. Is that right? Theory is necessary to a certain degree, but theory will not do the work; theory does not preserve the teeth; it will not place the gold of a filling in such juxtaposition to the dentine as to exclude moisture and prevent further decay. A man must have mechanical ability back of his theory. Theory may be the key-stone of the arch, but the key of the arch without the other parts is very weak. We must be symmetrical. I think the only criticism we can make against the colleges is that they are elevating theory at the expense of practice. Dr. Barlow, some years ago, expressed the opinion that students should have a larger degree of mechanical training than they were getting, and I agree with him. I think the students coming from the colleges should know how to make a set of teeth, how to swage plates, how to do creditably the various mechanical work that comes to the dentist, as well as to be filled with the pathology, anatomy, and the other things that they study, which I

doubt sometimes will be really of much value to them in every-day routine life. Yet I do not wish to be quoted here as being in the position of disparaging theory in the slightest degree. Theory and practice should go hand in hand.

Dr. G. Carleton Brown.—Mr. President, before I speak on this question I want to congratulate the society on the essay which they have had the pleasure of listening to to-night. It strikes the key-note to the advance of dentistry. I am delighted to have heard it from the source it comes from, a representative of the colleges. It shows the plane on which the colleges stand. The examining boards are criticised and the colleges are criticised; they both probably make mistakes, but it is not from intention.

Dr. Eaton spoke of the necessity of young men being put on probation with a preceptor. Now, that theory is a good one if it could only be carried out; but how many of the young men who go to college study first with a perceptor? Not one out of a hundred. That being the case, we have to call on the colleges to act in the place of the preceptor. I think I brought that question up a few months ago before the society, with reference to the statement of Dr. Crouse in his journal, that the colleges should require of a man before he was finally started in his course a certain amount of mechanical adaptability. If the profession at large cannot find this out, why cannot the colleges take it upon themselves; and if they find a young man who has positively no chance of ever becoming a dentist, tell him so, and send him to farming or something else. As Dr. Twilley said, there is too much of the money-making idea in dentistry. The great object of the student is to get through college as quickly as possible and then get to work making money; and the men who come from the farms and the backwoods are the very men who go into the "dental associations" that have been mentioned. They go to college originally with the idea of going back to their small town and doing what dentistry there is to do; but they do not go back there. They are in the city, they get imbued with the idea of city life and quick returns, which they know they cannot get in their own village, where they might do good work; and the result is that they gravitate into some one of these dental associations that are looking for men of that stamp; they offer what appears to these young men munificent sums to come into their employ and take charge of a lot of so-called students, and they become a curse to the profession. If the colleges can take hold and help the profession at large in this matter it will be a great advantage.

Dr. Osmun, I am surprised to find, has been able to grasp an idea that I did not know had gone beyond the examining boards, that really the colleges are leaning too much to theory and too little to practice. We are finding in our examinations, almost without exception, that while the men were very much better informed theoretically than formerly, their practical work is retrograding, and not only in the mechanical but also in the operative department. We had before us in April a set of students who were remarkable in some respects, but some of those young men who passed superior examinations theoretically knew very little about practical work, and were not fitted to carry on an office of their own. I hope the colleges will come to a realizing sense of the fact that in their noble efforts to advance the profession they have run in one direction, the theoretical, to the sacrifice of another and equally important branch, the practical.

Dr. Meeker.—Mr. President, we are all very much pleased to have had Dr. Twilley with us at this time to read a paper, especially as he is the representative of the oldest dental college in the United States. It seems to me that the whole tenor and lesson of the essay is the one important fact that we must be up-to-date dentists. That is what we must be, and to do it we must read the periodicals, know what is going on in the dental world, and be advanced in everything. The subject of cataphoresis is now coming into prominence, and I think dentists should know all about that subject. We hear of the dental associations that Dr. Brown mentions starting up all over the country, associations that extract teeth by so-called "vitalized air" and gas for twenty-five cents. They are working to get the patronage of the people, and we must be active in antagonizing them.

The President.—Dr. Gibson, of New York, is with us this evening; we would be pleased to hear from him.

Dr. Gibson.—Mr. President, I thank you for the honor, but I have been here as a listener to the paper and to get instruction, not thinking I would be called on to take part in the discussion. The discussion led me to thinking and to wondering, if we are to have students on probation for two or three years, then require them to spend three or four years in a dental college, and then to wait from one to six years before they can pass the State board, whether a man would not be too old to practise dentistry by the time he is permitted to enter the profession; and I could not help wondering where some of us would have been if those requirements were made about the time we entered the profession. As for myself, in

all probability, I would have been somewhere in the hills of Onondaga County raising potatoes. It has been my privilege and pleasure during the past ten years to give practical lectures at the Baltimore Dental College; and let me say, gentlemen, that there is a great demand on the students in that institution for a practical knowledge of dentistry. It is surprising what a man has to meet, what is expected of him before he can go out to practise; and I think that the State Board of Examiners are making a very serious mistake when they allow men to pass without a thorough practical examination. I think it is the fault of the boards of examiners that they are running altogether too much to theoretical examinations.

Dr. Barlow.—Mr. President, I have been very much interested in Dr. Twilley's paper, and also in the remarks of Dr. Osmun and Dr. Gibson. In my opinion dentistry is mechanical to a very great extent, even as regards the operative and surgical branches; a man who practises it must have the mechanical ability to handle tools. As regards the probationship of students, the examining boards find that those students who stand the highest and pass the best examinations are the ones who have first been under the preceptorship of competent dentists and good practical workmen, and then have gone through college. Referring to Dr. Gibson's remarks in regard to the requirements of the boards, I would like to state that the New Jersey State Board especially requires that men shall be well up in the practical branches; their percentage depends to a very large extent upon their operative dentistry and their mechanical work.

Dr. Fish.—I am surprised at the lack of mechanical knowledge exhibited by some of the students who come from the colleges. We find almost invariably that the colleges have gone into theory to the detriment of the mechanical and practical branches. I was astonished recently in looking over the examination papers of a young student who is in attendance at one of the colleges not many hundreds of miles from this city, to the east of us, to see that his examination was almost entirely in theory. He has been in the institution one year, and I must say that he has not learned the first rudiments of the mechanical branches of dentistry. It is all right to say that dentistry is a specialty of medicine, but you cannot escape from the fact that it is really a higher order of mechanics.

It is sad to see that the young men turned out from the colleges are almost wholly ignorant of the laws of leverage that

govern operations in the mouth, in the construction of bridges and crowns and fillings, all of which bear on the laws of leverage, velocity, and resistance, which they should know. It would be better for the colleges to teach a little natural philosophy instead of giving so much time to the theoretical branches. I am heartily in accord with the work of the examining boards, and I hope the colleges will give more attention to the mechanical branches of dentistry than they seem to be doing.

Dr. Baker.—Mr. President, I know that the colleges are not perfect, but I do not think they are altogether to blame for the deficiencies that have been spoken of. I am positive that, with the colleges we have to-day, if a man does not know dentistry when he goes out from them it is to a great extent his own fault. The colleges have competent teachers, they are provided with all the different appliances required in dentistry, and I think the student, if he chooses to apply himself, may learn the practical part of dentistry as well as the theoretical, although there are a great many chances, as I have myself seen, for students to slight their work through certain manipulations. Of course, the practical part of dentistry is not pleasant to a great many. I have seen men come from college who, I am quite positive, had not performed their work as they should have done it; but it is not really the fault of the professors. They have men under them who are supposed to teach the students what they should know. Men do get through without acquiring practical knowledge, as you have already seen, but I think it is more the fault of the students themselves than it is of the college.

Dr. Hull.—I may say, Mr. President, that I think too much is expected of students. Here is a gentleman from one of the colleges who can place in a superior gold filling, can make a perfectly fitting plate or a beautiful piece of bridge-work, and yet the college will not pass him, claiming he is not up in theory. As far as I know dentistry, it is an utter impossibility to do those things without being to a certain extent a theoretical man. It is right that a dentist should be educated, and I think they generally are fairly educated.

One thing I want to say of the State boards: I think they demand altogether too much of the student who has just graduated. They should not expect a young man to come out of college a thoroughly equipped dentist. He cannot get practice in college. He acquires theory, he gets an excellent foundation, and it rests with himself to make himself what he is to be.

Dr. Chase.—Mr. President, in the remarks we have had on this paper I do not think there has been anything said against it, and I shall say nothing against it. I am heartily in favor of its tenor. I think practical dentistry and theoretical dentistry must go hand in hand. A man may be able to put in a superior gold filling and to make good plate-work, and yet be absolutely unfit to treat an ulcerated tooth or prescribe the remedies that should be given in such cases, so it is necessary that he should have some theory. I believe, with the essayist, that theory and practice should go together.

Dr. Gregory.—When I entered college, Mr. President, I was given to understand at the outset that the college did not propose to make me a finished product, but rather to help me to gain such information as would start me out on my career,—in other words, that I was to be equipped sufficiently well that I might do my work intelligently, but not perfectly. The figure of the arch has been used here to-night as an illustration. There is one essential feature to be taken into consideration in constructing an arch, and that is the lateral thrust. I believe that if we dentists intend to practise our profession on a high plane we should educate ourselves up to that standard,—in other words, that we should have theory,—and I believe that is what the college should lay greater stress upon. Our profession is unique in that most of the men entering it have been handicapped by lack of education. Too many men seek to enter the dental profession without having had a good English education. They go to college, and the terms used there are a completely foreign language to them, they have to go to the dictionaries and lexicons in order to interpret the lectures. The only education they have when they begin to practise is what they have derived at college. If they are to be doctors or dentists or teachers they should have a broader knowledge. So I believe the colleges are right in the main, and that a man who goes through the college, if he is diligent and intelligent, will gain the information which he is afterwards to apply; and being well informed theoretically, he will, if he be honest with himself, soon find avenues that will lead to success for himself and honor to the profession he has chosen.

Dr. Brown.—Mr. President, I do not like to come up the second time, but I cannot resist taking advantage of the opportunity to show how opinions differ. We have had the opinions of two gentlemen from New York; one of them says the boards do not require a sufficiently advanced standard in mechanics, and the other

one says the boards demand too much. Now, that simply shows that our brothers from New York do not know what is going on in New Jersey, because they are both wrong. Dr. Barlow explained to a certain extent the requirements of the New Jersey Board in the direction of mechanical skill, and I would like to supplement his statement by saying that the men who come before our board have to show their proficiency in the mechanical branches before their theory is considered at all. A man who is not properly up in practice cannot get through the board, no matter how much theory he has. The other gentleman says the boards require too much, and that the colleges require a preliminary education to a certain standard; and he is wrong in both cases. The colleges, as a rule, do not, I believe, require any preliminary education at all. They say they do, but if the men who come out of the colleges ever had any preliminary education they have forgotten it before they get through, as their performances before the boards show. Such exhibitions of English you never heard in your lives as some of the graduates of the colleges present. In the *Western Dental Journal* of two months since, I think, I was called down for my paper that I read before this Association on this very subject, and it was said in the article referred to, written by the editor, who is a college professor, that some one was playing a huge joke on the Association, that some one, who had never been inside of a dental college, had come before the Examining Board just for the fun of the thing. Now, gentlemen, it is remarkable that a man would pay twenty-five dollars, and give three days' hard work, for the sake of having fun with the Association. I do not think the boards are too strict. I am sure if they err at all they err on the side of leniency. There are too many men creeping into dentistry who do not belong there. I believe the boards are trying to be fair in their examinations; they do not put any catch questions or examine upon anything that does not pertain to practical dentistry, and I do not believe that we can find one man who has passed the boards that are moving in that line, who will say that he has ever had anything but a fair and square examination; that if he failed he failed on points that he ought not to have failed on, and was glad he was compelled to acquire the knowledge before he passed. We have had a man who had been before the board eight or nine times before he could pass, afterwards come before us and thank the board for making him obtain the knowledge necessary to make him a professional man.

Dr. Pruden.—I hardly think that placing a student under pro-

bation is practical or feasible, for this reason, that dentists of to-day are very much opposed to taking students. I have taken two, and do not wish to take another. I was myself the innocent cause of making my preceptor come to the same conclusion. I think if you depend on filling the ranks from students thus admitted the profession would suffer by depletion.

Dr. Eaton.—May I answer that question, Mr. President. The time was when a young man wanted to study dentistry he went to a reputable dentist and he paid for the knowledge that he received. Now they expect pay. There is the mistake. If the colleges compelled them to serve six months in the office of some reputable dentist before the college would accept them, the private preceptor with whom they serve this time would be the judge, after six months' trial, of whether they were fit to take a college course and become dentists or not.

Dr. Graft.—Mr. President, I suppose I may be said to have both practical experience and theory. I had ten or twelve years' practical experience before I went to college, and since I left college I have been practising dentistry. In my opinion the proper way would be to require all prospective students to have some practical knowledge before they enter college. If a man had to serve six months with a good preceptor I think it would be the best thing that could happen to him. At the end of that time he or his preceptor could tell whether he would ever make a good professional man or not. I believe a law to that effect would be a very good thing for the colleges to take up.

Dr. Marsh.—My practical experience has been somewhat different from the usual order. My probation came after I graduated. I had no preceptor. I went through college, and flattered myself that I passed very creditable theoretical examinations. After I left college I soon realized that I did not know everything in dentistry. I was fortunate in obtaining a preceptor in a very excellent dentist. When I finished with the college education which they gave me, it was my good fortune to be a lecturer on oral surgery for a number of years in a Western college, and I found that theory in college was an excellent thing, and I also found that I did not know everything; I had to study almost as hard to keep up as I did when I was in college. Those experiences have taught me that we do not learn everything in college. As one speaker said, young men go to college with the idea that they have nothing more to learn when they graduate. On the contrary, the college teaching is only the beginning of knowledge; it is only a good

start in the right direction, and it depends upon their subsequent work and study whether or not they make a success in dentistry, provided they have the necessary natural ability.

Dr. Twilley.—Mr. President and gentlemen, really I do not think there is anything left for me to say. It has all been said. I will say this much for myself: I came before you this evening with some little fear and trembling; I had been with the members before in other quarters, and I expected really a good old fight; but I do not feel very much flattened out by the criticisms and remarks made on my paper. I think that I did not make myself quite clear to several of the gentlemen who have spoken; for in the discussion they have really given me credit for thoughts in the paper which I did not have at all. I most undoubtedly hold that the college does not give the finish to the education of its graduates. It is only a primary school. Unfortunately, a great many young men come out of college with the impression that they are the equals of any man in the profession, and the superiors of many. That is a misfortune.

The colleges are raising the standard of graduation to some extent, as some one has said, theoretically, but you must look to the State boards if they are raising it too rapidly. They certainly wish that the graduates shall be thoroughly equipped, evenly equipped, if possible, and they do all in their power to make them so; but it is very difficult, indeed, to have a body of men go out from school all equally qualified to practise dentistry. Go into the artist's studio, and you will see a number of students all using the same paints and the same brushes, but, oh, the difference in the pictures! So it is with the men who walk out of college as new dentists,—there is a great difference in the pictures.

On motion, the subject was passed.

The President.—Incidents of office practice are now in order.

Dr. Meeker.—Mr. President and gentlemen, I am at present greatly interested in the subject of cataphoresis for the purpose of bleaching teeth and obtunding sensitive dentine, and I know other members here are in the same condition. In the past year I have used the Edison machine; now I use the Wheeler volt-selector. I have had a great deal of success with it, and I must say that the best success I have had in bleaching teeth was in a case that I treated about ten days ago,—a tooth with two gold fillings in it. I had treated it for three months for abscess, had succeeded in getting it in good normal condition, and I bleached it nicely in thirteen minutes with eleven volts measurement of the Wheeler machine.

I think that is very good. I have not been able heretofore, with the use of pyrozone, hot air or dry air, to thoroughly bleach a tooth with a gold filling in it, but with this volt-selector I have been able to drive the pyrozone through the tubuli of the tooth right up to the gold filling. I have been using a number of medicaments in obtunding sensitive dentine: I have used cocaine, I have used atropine a little during the past week, but my best success has been with Parke Davis & Co.'s hypodermic tablets. This formula is hydrochlorate of cocaine, morphine, and sulphate of atropine. In the use of these tablets I take six drops of salt water, and apply the positive pole to the dentine of the tooth. The shortest time consumed in rendering anæsthetic the sensitive dentine of a tooth has been thirteen minutes, with five volts. To-day I tried McKesson & Robbins's new guaia-cocaine,—the aqueous solution,—having a rubber dam on. It was a cervical cavity, and it took me fifteen minutes. It may be that the action of the current was not strong enough, but after applying it that time the tooth was anæsthetized so that I could cut without any pain whatever to the patient. To-day was the first time I had a chance to use it,—I have had the appliance only a week. I have used hydrochlorate of cocaine electrically, and it has done very good work, but this little tablet of Parke Davis & Co. has so far seemed to be the best. I am not prepared yet to say positively it is the best. I think if those who are using this machine will try these different remedies, and keep account of the results obtained in each case, we will finally come to a remedy that will give us the desired effect in a very short time, and in the end time will be saved in filling the teeth.

Dr. Eaton.—May I ask Dr. Meeker in how many cases he obtained total anæsthesia?

Dr. Meeker.—I have had no case in which there has been total anæsthesia. I have had cases where I used the agent for five minutes, began to cut, and then found sensitiveness; then I applied it for five minutes more, and so was able to prepare the cavity. When the patient complained of any pain or excessive sensitiveness, I would stop and turn on the current again. I have heard a number of gentlemen in the profession say they have used as high as forty volts on a tooth. I have not thus far used over fifteen volts.

Dr. Eaton.—Mr. President, I had a case of two lower twelfth-year molars with crown cavities. I placed the negative pole in the hand of the young man, and ran the current up to forty volts without giving any sensation. Then I placed the negative pole on the side of the face and ran the current up to forty volts without

having any sensation whatever; and I had the same result with similar teeth on the other side.

Dr. Osmun.—Mr. President, it is unfortunate at the present day to have heard of these new things and meddled with them, because you are called on before you have had much experience to explain the results obtained. I have what is called the Van Woert cataphoresis machine, made by Wade & Bartlett, of New York. I am not wildly enthusiastic over it at the present time. I think it has some merit; I don't think it is a panacea for all the ills that patients have had to suffer in having teeth filled. I have had a very peculiar experience in the use of it. Sometimes the result has been satisfactory, sometimes it has been unsatisfactory. I am not disposed, with my present knowledge, to condemn the machine as much as I am to condemn the operator. I think the ignorance of the operator has more to do with the failures than has the machine, and that seemed to be the opinion of my friend Dr. Brown this morning; he assured me it was simply want of a little more practice and knowledge on my part with reference to manipulating the machine, and with that I would have no further difficulty. He said he had the same difficulty in the beginning, but he had overcome it. My theory for several years has been, in reference to obtunding sensitive dentine, that the best method is to have clean, sharp burs, steady hands, an engine revolving at a moderate rate of speed, but running steadily, telling the patient you are going to hurt him a little, and then doing the work deftly and quickly. Up to the present time, I have not found anything that I would trade off for my sharp, up-to-date instruments, deftly handled.

Dr. Gregory.—When Dr. Gillett was before the State Society with his machine demonstrating the use of the electric current in the introduction of cocaine, I became very much impressed in its favor. I had no volt-selector, but I did have a four-cell battery. I happened to have a patient, a boy twelve years of age, for whom I had to place a filling in each of the superior central incisors. The pulp was very nearly exposed, and he was an extremely nervous boy; I thought I would try Dr. Gillett's method in that case. I used a saturated solution of cocaine, applying one of the electrodes, the positive, to the tooth, and had the boy grasp the other electrode in his hand. I thought about one volt of current was severe enough. Not having a rheostat, I hardly knew how to manage, and I took the negative electrode and applied it to his ear, and in that way controlled the current. After applying the current for seven min

utes I was able to make the necessary grooves and build down the teeth with gold. The boy did not complain a particle. That has been a very great argument with me in favor of cataphoresis.

The President.—I will call on Mr. Wheeler to tell us something about cataphoresis.

Mr. Wheeler.—Mr. President and gentlemen, I don't know that I can add anything to what has been said on this subject here to-night, with the exception of a little on the subject of electricity and rheostats, and the reasons why you cannot expect to have successful cataphoric action in dental practice without pain when using a rheostat as the means of controlling the current.

A rheostat is a resistance, an obstruction, to the flow of electricity. It is placed in circuit between the source of current-supply and the patient. Increasing the value of this obstruction decreases the current, and *vice versa.*

Now, in actual work on tooth-structure you have other ever-varying obstructions or resistances to the flow of electricity that are entirely beyond your control. The most important of these is the ever-varying resistance of the tooth itself, its dentine, and pulp. Then you have the ever-varying resistance of the solution intended to be driven in, together with the varying joint resistance of both dentine and solution as the solution is carried into the dentine. These variations entirely preclude the use of rheostats, or so-called current-controllers, for painless, rapid, and successful cataphoric work, by reason of the fluctuation of electro-motive force or potential at the tooth terminals, which, according to well-defined laws, must follow the changes in value of resistance. As the potential increases at the tooth-terminals in proportion to increase of resistance of the tooth, so the pain increases; and if by chance, as often happens, connection should be broken, a severe shock to the patient must ensue if sufficient current is passing to accomplish the purpose within a reasonable time.

The above facts will account for a great deal of the pain talked of by those who use that class of apparatus.

About the length of application required I find great diversity of opinion. I have had practitioners tell me that they have successfully obtunded the parts to be operated on in a minute and a half or two minutes. I myself have never produced complete anæsthesia in less than five minutes; in a great many cases it has been ten or twelve minutes, and I have been as long as twenty minutes. Care is required in placing the poles of the battery. Be sure to lead the positive pole to the tooth of the patient. It is

so easy to change about, and lead the negative pole to the tooth without knowing it, and then you wonder why you do not get anæsthesia, and proceed to condemn the apparatus and cataphoresis generally. Of course, the negative pole will not produce anæsthesia ; the medicament is driven in only from the positive pole, and the higher the voltage you can attain the quicker the operation. A tooth requires more time to anæsthetize than the soft tissue, partly on account of its comparative density of structure. The resistance of a tooth is much more than that of other tissues. And this resistance varies a great deal. In young persons' teeth the resistance is much less than it is in those of elderly people. This difference is ascribed to the fact that the dentine in the teeth of young persons is looser in structure than it is in those of older persons. I find that the resistance in one tooth will sometimes vary as much as thirty or forty thousand ohms during one operation. It is necessary to keep a steady voltage ; it will not do to let it race up and down, as by rheostat control.

Dr. Meeker.—Mr. President, I would like to ask Mr. Wheeler what is the best medicament for accomplishing anæsthesia that Dr. Morton uses on the teeth, the hard and soft tissues?

Mr. Wheeler.—Guaia-cocaine has been, in my experience, the best,—and I think I can speak for Professor Morton also,—because it does the work quicker than cocaine alone would, and the effect that guaiacol has with cocaine is to localize the anæsthesia. It will not allow the cocaine to be given off in the circulation as quickly as it is if a simple aqueous solution be used. I understand that there is another medicament that Professor Morton is now at work on, which is to be another step in advance in this direction.

The President.—Will Dr. Evans favor us with some light on this subject?

Dr. W. J. Evans.—I think I can promise you, Mr. President, that within a short time there will be a new salt developed from this union of guaiacol and cocaine which will be presented to you, with the result of enabling you to do things which will be worthy to be written about. It would only be natural that a dentist should be the one to do things before he writes about them rather than write about them before he does them ; it would be in line with everything that has been said here to-night. I can assure you, my friends, that it gives me great pleasure to announce to you that, through the investigations of Professor Prescott, of Ann Arbor, you will be presented with an entirely new salt, but it is not yet ready. The solution which Dr. Meeker spoke of to-night, the

aqueous solution of guaia-cocaine, contains twenty per cent. of the product resulting from the union, consequent on the affinity which cocaine has for guaiacol; and it will be a result of that which will give you something which Professor Morton thinks will be superior to cocaine, something which you can use without any of the caustic or toxic effects, or bad odor, or any of the objections that you have found with guaiacol.

I was very much interested to-night in the discussion about the qualification of dentists. It seems to me that the qualification to do good work fills a place of very great importance the moment you take up the study of cataphoresis. It is entirely futile and a waste of time to make arguments against cataphoresis, because cataphoresis is a physical fact. It has been demonstrated that the electrical current will make certain fluids move from the positive pole, without resistance, towards the negative pole, and no more argument is necessary on that subject. The means by which you are able to produce that result offer a very large field for investigation; it will be a very interesting field, one in which the practical dentist, with his mechanical skill, will probably be able in the end to do things worthy to be written. Until we hear from Professor Prescott just what is the precise nature of the discovery that has been made, I am not in a position to make any further announcement, but I can promise you something quite important, which will verify what has been published by a Frenchman in this connection. We hope to be able to retain in guaia-cocaine the anæsthetic properties of guaiacol without its objection, added to the full force of cocaine.

Dr. Meeker.—Mr. President, if, as Dr. Evans says, we are on the eve of the discovery of a new anæsthetic which will possess the properties of cocaine without its toxic effect, then dentistry in the future is going to be easy work, and the up-to-date dentist will do that work, and not the dental associations that inject hypodermic solutions into the gums.

Dr. Eaton.—Mr. President, it is very much to be desired that we shall be able to use cataphoresis in teeth that have already one filling in them. I have found much trouble in such cases. It causes a great deal of pain, and I am going to ask Mr. Wheeler if he will give us the benefit of any discovery he has made in regard to leaving that condition of pain.

Mr. Wheeler.—The one thing to do in such cases is to thoroughly insulate the filling that is in the tooth with sandarac varnish. Dr. Gillett uses Gilbert's temporary stopping. I think a shellac varnish

would be a better insulator. If you thoroughly insulate the filling in the tooth you will have no trouble with it.

Dr. Eaton.—The question I want to get at is this: the electricity having some affinity or finding less resistance in a filling, after it passes through a portion of the tooth, the fluid having been forced through a portion of the dentine and coming in contact with the filling, somehow causes pain near the filling. The temperature of the filling is raised, I believe, and I think that produces pain; is that so?

Mr. Wheeler.—No; the effect of the metal in the tooth would have a tendency to lower the temperature in the tooth.

Dr. Eaton.—Why do we get pain in that condition, where a tooth has a filling in it?

Mr. Wheeler.—The only thing that could give pain in that condition, to my mind, would be the incipient electrolysis of the metal in the tooth. There is a tendency of the anæsthetic to be drawn towards the metal in the tooth instead of directly down towards the root-canal. I have noticed that a tooth becomes anæsthetized first in the portion towards the filling. I have also noticed that it takes a little longer to obtund teeth with filling in them, for the reason given. The resistance of a tooth is very great as compared with that of the soft tissue, and in teeth of people of advanced age I have found very high resistance.

Dr. Meeker.—That is because the lime-salts are more calcified.

Mr. Wheeler.—I suppose so. I know that the older a person is the slower is the cataphoric action.

Dr. Adelberg.—Mr. President, my experience with cataphoresis has been of a somewhat varied character. I have had most remarkable success in some cases, and some wonderful failures in others. For instance, I have drilled into a tooth and taken out an amalgam filling, using cataphoresis, in an upper molar, drilling into the nerve-canal and extracting a mummified pulp; and then at other times it produces great pain. The mummified pulp I have here in my pocket. I had a very queer experience in the use of cataphoresis on a lady, a woman weighing two hundred pounds. The peculiar part of it was the effect on her fingers. She wore rings and could not get them off, she was so fat; a few days after the operation she came back to me with blisters on her fingers under the rings. I had used cataphoresis to the fullest extent, pumping it up to forty volts; she did not complain of any pain, although the tears ran out of the corners of her eyes. I was using it on an upper third molar that had two cavities, and I managed to

get the sensitiveness down so that I could excavate them. The lady had a highly nervous temperament, her teeth were extremely sensitive, and during the operation she complained of the negative pole hurting her fingers, especially around the rings. I told her to wrap her handkerchief around the rings. I ran the current up to forty volts, and could excavate the tooth, although I did not get full anæsthesia. I thought I would report this case, as I had never heard of a similar experience, and I would like to know if others have had the same result. I am sure the blisters on the fingers must have been caused by the negative pole, because she did not have anything else in her hand.

Dr. Brown.—Mr. President, I gave my experience with cataphoresis at the last meeting, and if I were to say anything now it would simply be a restatement; but from my experience I can support Dr. Adelberg in his views. I had a case where there were blisters raised under the rings where the negative electrode was held in the hand. The patient complained of the sensation at the time, but I desired to keep the electrode in her hand; I wanted to see what it would do. I think it would be advisable to have the patient take the negative electrode in the hand that contains no rings on the fingers, and I have adopted that method ever since. The guaia-cocaine salt will certainly be a wonderful thing if it proves as efficacious as it is supposed to be. At our last meeting Mr. Woolf said he would do a little work in this line and report to you. He has, in connection with one of the chief chemists of the New York Board of Health, been working in this direction, and a few days since he sent me certain preparations which they claim will completely revolutionize this whole business of cataphoresis. I cannot tell you what they are, I could not promise their names; but if these new preparations show up as they say they will, I think, after we write the names on the black-board at Asbury Park, we will really have something to publish.

On motion, the subject of Incidents of Office Practice was passed.

Dr. Meeker.—Mr. President, I move that a vote of thanks be given to Dr. Twilley; and I also move that Dr. Twilley be made an honorary member of this Association. He has been with us a number of times at our meetings and has shown some interest in the Association both at Asbury Park and Newark.

Dr. Meeker's motions were carried.

Adjourned to the third Monday in September.

Editorial.

SARATOGA, 1896.

The convention period has come and passed into history. Whether this will mark an epoch is doubtful, nor was it expected. The true scientific and practical work of the dental profession, as stated in a recent article, must be sought for elsewhere, but that does not detract from the usefulness of these bodies, for their value cannot be found so much in the work accomplished as in the general binding influence they exercise over the widely-distributed circle of workers. Without a central delegated body there would be a want of uniformity or lack of completeness in professional life, and hence, whatever may be thought of these national conventions, there is no probability of their passing away in this generation. That the machinery of professional work could be improved there can be no question; but if this should ever be effected it will be accomplished by slow processes of evolution through a higher conception of means to ends.

Saratoga has been the place of many gatherings of the dental fraternity. It, perhaps, would be difficult to define why every four or five years this place should seem to have sufficient attractions to secure a majority of the votes of the members of the American Dental Association, but such has been the fact. The reason for this may be found in the quiet beauty and restfulness of the place, for it is this, notwithstanding the general idea is exactly the opposite. This celebrated resort is just now undergoing a transition from the era of gambling and horse-racing to another and, it is to be hoped, a better time when the public will seek it for more laudable purposes. The present condition, however, is not altogether satisfactory to the many who seek to glean a living from the restless travelling American life. They have flourished best under the old reign of wickedness, but the time will come when the truer life will assert itself and demonstrate, as has been done in other cases, that true prosperity can never be founded on a basis of evil.

The various national conventions,—the National Association of Dental Faculties, the National Association of Dental Examiners,

the Dental Technic Association, as well as the parent body, the American Dental Association, had full representation.

There was nothing of very great importance accomplished in either of the two first named, nor was it anticipated. Legislation for colleges has reached a point where it is better to advance slowly. The feeling was, however, very evident that a marked advance in the near future would be required, as it was evident that, with the extension of the curriculum, four years would soon be necessary, as well as an increase in the length of the term. There is probably no one of the national organizations which concentrates so much of interest as this society, and naturally so, for it embodies in its membership some of the best of the intellectual forces in the dental profession of the United States. With such a body of thinkers, meetings could not fail to be full of interest, and the yearly discussion of educational problems furnishes a means of centralizing questions which, when distributed to distant colleges, must exercise an influence for growth not to be over-estimated. The "Faculties," as it is familiarly called, was a creation made amid the most discouraging conditions that ever prevailed in dental education in this country, and when the late Professor Winder suggested such an organization, it was regarded as an almost hopeless effort. The attempt was made, and now, in 1896, the organization dominates the dental education of this country, and will continue to do this just as long as wise counsels prevail. There has been no tendency heretofore to use this power but for good, and it is hoped that those in control will avoid the rocks upon which so many similar organizations have been wrecked.

The tendency to legislate for everything in the United States is a serious and growing evil, and the multiplication of laws governing this profession indicates that the time will come when we will have reason to regret the increase of statutes shackling the free action of professional work. Within reasonable limit this is well, but in every direction the boasted freedom of the people will exist only in name, unless the unwise appeals to law are held in check. The National Association of Dental Examiners has an advisory work to do in this direction, and if this be properly used, many of the clouds that obscure our professional horizon may be dispersed. What the work of this organization was at Saratoga we are not at this writing informed, as its sessions are not open to the public; but it is an annually growing power, and what is true of the National Association of Dental Faculties is equally applicable to this body.

The meeting of the American Dental Association was not as satisfactory as could have been desired. It was fairly well attended, perhaps more so than could have been expected under the depressed conditions of the country. The so-called scientific side of dentistry was well represented in several able papers, but the practical was almost wholly neglected. It is difficult to determine why this should have been, for the past year has not been, by any means, a barren one in the direction named; indeed, it has undoubtedly in many respects been an advance over several previous years. While a general apathy seemed to prevail in the branches of operative and mechanical dentistry, it is probably due to other causes than a lack of interest.

It seems to the observing and reflective mind that dental association methods have reached a condition that should cause thought, and suggest the question, "Have we not arrived at a period when a change would be profitable?" Large bodies necessarily move slowly; but it is quite evident that whether fast or slow, they must move, or their usefulness will come to an end. The American Dental Association is an active, energizing society, and has by no means reached the period of senility, which comes to associations as well as individuals sooner or later. Its power for good cannot well be over-estimated, but that will cease if allowed to drift into a state of lethargy.

There is an anomalous condition existing at present in these United States, the tendency of which is not for the best interests of the dental profession. It is true of organized bodies, as it is of all the relations of life, that divided councils tend to weakness. Two national bodies in dentistry is a positive error, and it has been felt for years that this should not be permitted to continue.

The American Dental Association and the Southern Dental Association will meet next year (1897) at Old Point Comfort, and it is to be hoped that mutual sacrifices will be made looking towards a union of these two organizations. The state of divided interests should not be allowed to continue. With union and new life infused in both Associations, dentistry would, we are satisfied, spring into newness of life. That this is a general desire must have been evident from the expressions at Saratoga, and it is felt that this meeting, though not as full of good things as many preceding ones, will outrank them all, in that it marks an epoch of good feeling and a desire to harmonize all conflicting interests and gather all into one national body. That this was the feeling was evident in voting for a place of meeting next year. The desire to meet with our

Southern brethren caused the majority vote for Old Point Comfort. There can be no question but that Denver would have been selected had it not been felt that this important question must be settled. In 1898 the united body should go West, and Denver seems a happy compromise between California, in the far West, and Old Point Comfort, Niagara Falls, and Saratoga in the far East. The interest taken by the people of Denver in efforts to secure the meeting there next year was not only remarkable but was very satisfactory and complimentary to this body of dental workers, and while it was felt necessary to disappoint them, there is no reason why the succeeding meeting should not be held there; indeed, it is essential to the well being of the national organization that this should be decided upon at the proper time.

The conventions of 1896 having completed their work, we may confidently anticipate that their influence will be a continually aggregating force for the higher development of the profession they aim to represent and in the interest of which they have been organized. Let, then, Saratoga, 1896, be the beginning of the closing years of the century, an ending that should be replete with activity and in an extended growth in all things essential to the well-being of dentistry.

THE

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Original Communications.[1]

SALIVARY CALCULI.[2]

BY GUSTAV FÜTTERER, M.D.[3]

A few months ago I extracted two calculi from a submaxillary gland, and, as such calculi are very rare occurrences, I thought it well to report the case; Professor Christian Fenger then favored me by putting at my disposal a calculus which he had removed from Wharton's duct, and Dr. W. P. Verity kindly gave me another, which he had taken away either from a sublingual gland or from one of its ducts.

Case I.: *Submaxillary Calculi.*—Mr. M., thirty-four years of age, about four years ago, while eating, noticed the appearance of a swelling under the jaw, on the left side. A moment's pressure of his finger on the swelling caused it to disappear. This occurred several times. Three years ago this spring he noticed a similar

[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] This article, by Dr. Fütterer, on "Salivary Calculi," is reprinted from *Medicine*, a new medical journal, by special request. Our rule not to republish papers under the original heading is laid aside, in this instance, on account of its special value and, further, that dental readers will not, as a rule, have the opportunity otherwise of referring to it. The very extended bibliography will be of great value to future writers upon this subject.—Ed.

[3] Professor of Physical Diagnosis, Chicago Policlinic; Attending Physician, Cook County Hospital; Attending Physician, St. Elizabeth Hospital; Consulting Physician, Deaconess Hospital.

swelling, which, however, became enlarged and painful; pressing had no effect. A physician was called, who prescribed poultices and leeches, and after a week the swelling gradually disappeared. After about six months the same trouble came again, but this time it did not yield to treatment as readily as before. After about another six months it again made its appearance and was more stubborn than ever. Altogether the patient had suffered from such attacks four or five times when he called upon me.

I found him a tall, slender, somewhat anæmic man, with a "weak" stomach and an enlarged gall-bladder,—he had suffered from several attacks of gall stone colic; he complained of pains in the left submaxillary region and some difficulty in swallowing. The left submaxillary region was swollen; there was a swelling on the floor of the mouth, along Wharton's duct; and on pressure of the submaxillary gland, pus of a greenish color escaped from the orifice of Wharton's duct on the left side. A calculus could not be felt, but the frequent attacks on the same side, in the course of years, together with the fact that the patient had never suffered from tonsillitis, pharyngitis, or stomatitis, suggested the idea that a calculus might be the cause of the trouble.

I then called in Dr. John S. Marshall for surgical aid. Dr. Marshall passed a small silver probe into the duct and discerned, at a depth of seven centimetres from the cutting edge of the inferior central incisor tooth, a hard body, which led to the belief that a calculus was present in the gland. He then cut open the upper third of the duct, and introduced an especially prepared slippery-elm tent, intending to remove the tent after a lapse of twenty-eight hours and look for a calculus.

In the course of the next night the swelling and the pains increased considerably, involving the left side of the face and neck, and the whole tongue, compelling me to remove the tent after it had been in position for twenty-four hours. The removal of the tent was followed by a gush of about an ounce and a half of saliva and greenish pus. On passing a probe, we felt a calculus deep down in the gland. Dr. Marshall then passed a grooved director down to the calculus, and with a curved bistoury laid open the duct throughout its entire length. The incision measured about two centimetres at the surface of the floor of the mouth, but probably not more than one centimetre at the level of the calculus. This, however, did not enable him to take hold of the calculus and extract it. My own attempts in the same direction also failed, and we therefore packed the incision to further dilate the duct and make another attempt the

following day. The next morning, after removing the packing and washing the gland thoroughly with a five-per-cent. solution of carbolic acid and then with peroxide of hydrogen, through a rubber catheter, I succeeded in removing a small faceted calculus of a yellowish color, weighing one grain. On the same evening I removed another calculus, also of a yellowish color, weighing twenty-four grains. A

FIG. 1.

Calculus from submaxillary gland (Fütterer).
Natural size.

thorough probing of the cavity convinced me that no more calculi were present, but for greater certainty I introduced a urethral electroscope, and, as the bed of the concretions was in the upper posterior portion of the gland, I had no difficulty in submitting the parts to ocular inspection. If the thought of using the electroscope had suggested itself to me sooner, I could have easily ascertained the size, shape, and position of the calculi, and this would have facilitated their extraction materially.

During the following two weeks the cavity was cleaned twice a day, and after each cleaning the duct was loosely packed with gauze to prevent foreign bodies from entering. Later on, when the duct grew smaller, a silver tube was introduced and allowed to remain. Twice this tube was changed for a smaller one, and now the patient wears one that has about the diameter of a normal duct. All those tubes I fastened to the incisor teeth with silver wire.

Chemical Examination.—Dr. J. A. Wesener, who made the chemical examination, reports as follows: "Specific gravity, 1584. It is composed of calcium, sodium, and potassium acid phosphate, with a trace of xanthine and iron. Tests for ptyalin, potassium sulphocyanide, fats, fatty acids, carbon dioxide, magnesium, and inorganic acids, negative."

The microscopical examination (Fütterer) gave no particular results.

CASE II.: *Calculus from Wharton's Duct.*—The following history was kindly given me by Professor Christian Fenger, who observed the case:

Mrs. X., fifty years of age, on partaking of sour food, would

occasionally notice a little lump arising in the right submaxillary region, accompanied with some pain. In half an hour the lump would disappear, and would not return for two or three months. So it ran along for years. The patient never had any sore throat or stomatitis until about two months before operation, which was performed on the 21st of January, 1895. The lump, however, had been continuously present for some time, the submaxillary swelling tender, and the throat and right half of the floor of the mouth sore. Swallowing was painful all the time, and she had been gargling with listerine since the latter part of November to cure what she considered to be a sore throat. Sometimes when she sat down to a meal, the lump would assert itself very suddenly, with a kind of dull pain, which would continue for fifteen or twenty minutes, sometimes an hour, or even on rare occasions an hour and a half. Then the swelling would disappear spontaneously. She never noticed that any fluid came into her mouth, or that she had to spit; the swelling simply disappeared. When the swelling was present there would be a sensation of pain and distress in swallowing.

Under anæsthesia the duct was opened for three-quarters of an inch, and with forceps a stone was removed from behind and below the posterior border of the mylo-hyoid muscle. The cavity was about two centimetres long and one centimetre wide. The duct was found dilated. The cut portion was united by sutures, and healed almost entirely by first intention. After healing, a probe was passed freely from an opening close to the papilla to the posterior part of the duct, where an opening into the mouth remained, through which saliva or clear mucoid fluid could be squeezed up by pressure on the gland. Ten days after the first operation, Professor Fenger, without an anæsthetic, closed this opening by sutures; after three weeks it was closed permanently.

Fig. 2.

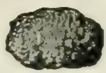
Calculus from Wharton's duct (Fenger).
Natural size.

An examination made April 18, 1896, showed that the patient had remained perfectly well; sublingual and submaxillary glands normal, also Wharton's duct; no opening at posterior border of mylo-hyoid muscle; a probe could be passed through a small opening two millimetres outside of the papilla for a distance of two to three centimetres; duct not dilated.

Chemical Examination.—Specific gravity, 2306. Stone composed of calcium, sodium, and potassium acid phosphate, with a trace of iron and uric acid.

CASE III.: *Calculus from a Duct of the Sublingual Gland.*—Dr. W. P. Verity gives me the particulars of a remarkable case. His patient was a woman aged forty. At the age of twelve she began to feel a swelling at the left side of the floor of the mouth, which would come and go, and which interfered with mastication, but not with swallowing; twenty-eight years later the swelling had increased so that it lifted up the tongue and pressed it over to the right side. Interference with mastication increased, but there was no difficulty in swallowing. A calculus could be felt about one and a half inches from the caruncula salivalis. Dr. Verity cut into the mass; pus was evacuated, and with it a calculus.

FIG. 3.



Calculus from duct of sublingual gland (Verity).
Natural size.

The calculus was of cylindrical shape, the ends rounded off, flattened on one side of its longest diameter so that a cross-section would show a plano-convex shape; surface warty, color grayish-white, and consistency hard.

Avenzoar, who lived in the thirteenth and fourteenth centuries, seems to have been the first to recognize the presence of salivary calculi "under the tongue." The earliest cases of which I have read the account in the original were reported by Lister[1] in 1672, and by Bonavert[1] in 1698.

Lister reports: "After a severe cold a patient noticed a hard lump in his mouth. This was due to a calculus, and about eight years passed between its breeding and its being taken away." As to its growth and the inconveniences thence ensuing, he further says, "Upon all fresh cold-taking, he suffered much pain in that part, and yet, that cold being once over, the part was no more painful than the rest of the mouth." Lastly, as to the particulars remarkable at the time of its being taken away, he relates: "It began its work with a sudden vertigo, which lasted from spring till August, in which month, without any previous cause, save riding, the place where it was lodged suddenly swelled and emitted purulent matter

[1] Philosophical Transactions, London.

at the aperture of the Whartonian duct. Then it suddenly stopped its running, and swelled with great inflammation, and very great danger of choking, causing great pain when endeavoring to swallow anything liquid. Incision; removal of a whitish calculus, which weighed seven grains."

Bonavert relates his case as follows: "Thomas Wood, of Wrotham, was so troubled with a quinsy that he could hardly swallow any liquid. I found the tumor tend to suppuration inwardly, about the root of the tongue on the right side, though it was almost as large as an egg outwardly, but without any sign of suppuration there. I ordered him maturating gargles, and the next day sent my man and bid him advise him to endeavor to break it with his finger, which the man effected and brought out of his mouth near the quantity of a quarter of a pint of matter, and with it, at last, the calculus. He had likewise a ranula, and before he had broken the tumor and spit out the corruption he could hardly speak. I believe this stone to be of the same nature as those generated in the kidneys and bladder. The weight of this stone in air is seven grains, and its specific weight, compared with water, is near $1\frac{91}{103}$ to 1."

Before the year 1800 the following writings dealt with our subject:

Lister: Philosophical Transactions, London, 1672.

Bonavert: Philosophical Transactions, London, 1698.

Lister, M.: A stone cut out from under the tongue. Philosophical Transactions, London, 1700, iii. p. 155.

Scherer, C. A.: De Calculis ex Ductu Salivali Excretis. Argentorati, 1737.

Hartmann, P. L.: Calculum Sublingua Excretum Describit. Helmstadii, 1762.

Würger, F.: Bemerkung von einem Speichelsteine. Kopenhagen, 1778.

Titius, S. C.: De Calculo Salivali, Sponte Excreto Observatio, 1794.

Immisch, in 1861, opposed the opinions of English physicians, that there was a practical relation between the origin of salivary calculi and gout. His own opinion was as follows: "Inflammations of the salivary ducts are frequent occurrences, and if such inflammations become chronic they may cause small elevations and indentations which will narrow the lumen of the duct, thereby causing a retention of saliva. Saliva will be retained in folds and pockets, and crusts form, to which mucus and pus are added. This crust leaves open the centre portion of the duct, and so the canal is formed which has been found in salivary calculi. In the interior of the

gland the calculus is formed in the same manner, but here the calculus has no central canal."

Mareau accepts three causes: first, foreign bodies which have accidentally entered the duct; second, tartar (hypothesis of Richet); third, inflammatory strictures.

Let us see what material literature gives us for reasoning in this direction.

De Closmadeux (1855) says that in two cases foreign bodies had been found.

S. Michel (1867) describes the formation of a calculus in a duct of the sublingual gland, after this duct had been pierced through by a fish-bone, the latter forming the nucleus of the calculus.

J. W. Hulke (1872) found a dark central speck, which proved to be a fragment of wood.

Rochs (1894) saw shot as a nucleus, in a musician who used to clean his instrument with shot; it had been aspirated, pressed into the caruncula salivalis, and by way of the duct had entered the gland.

Rayer found a foreign body the size of a gooseberry-seed as a nucleus.

Roberts (1869) saw a man fifty-four years of age who, twenty years before, had eaten some mustard and got a small mustard-seed under the tongue, which caused him violent pain for some days. The pain finally subsided, but the patient felt a small lump there ever after. This lump under the tongue would swell and pain him whenever he took cold, but the trouble would disappear with the cold. Dr. Roberts removed a calculus, and in its centre found a cavity "very much the size and shape of a mustard-seed," but he found no mustard-seed.

In the foregoing six cases foreign bodies were ascertained beyond a doubt as the nuclei of the calculi, while in one case it seems certain that a mustard-seed had been there but had disappeared.

Kochling (1835), who published a case of calculus, thought it necessary to mention that the teeth of his patient were covered with thick layers of tartar, and Mareau and Richet also call attention to tartar as a probable cause.

Wyatt Pratt (1871) had a patient who had once shown symptoms of tuberculosis of the lungs, and had coughed up from the bronchial tubes some calcareous concretions, while later came a number of calculi from Wharton's duct.

Gross foreign bodies which enter the mouth with the food, or

in a more accidental manner, can become the cause and the nuclei of salivary calculi. This has been found true in a comparatively small number of cases. Extraneous materials present in the oral cavity, breaking loose and entering the ducts, can cause the same effects. I refer to fragments of decayed teeth, and especially tartar. The fact that chemical analysis revealed in my own case xanthine, a derivative of uric acid, and in Professor Fenger's case uric acid, points to tartar as a cause, as tartar sometimes contains uric acid. Dr. J. A. Wesener, who has analyzed the tartar of one hundred teeth, found uric acid in eight of his specimens.[1] Small pieces of tartar often break down and can very easily enter the ducts, especially Wharton's duct, and here we find the most calculi, which are very rare occurrences indeed in Steno's duct. Gravitation will bring the pieces down to the bottom of the mouth rather than up to Steno's duct; they will also remain there longer, and occasion to enter will offer itself more readily. The lower incisors are places of predilection for the formation of layers of tartar, which here project as plates over the margin of the gums and easily break down.

Bacteria, especially leptothrix buccalis, may give rise to the formation of a calculus. Bacteria have so far, according to my knowledge, not been found in salivary calculi, and I have not found them in my cases, but that is of little importance if we remember that a mustard-seed could have disappeared, and that tubercle bacilli seemingly disappear in old fibrous and calcified tubercles, and if we further consider the length of time needed for the formation of a stone.

A certain disposition for calcareous depositions is indicated by the case of calculus of Wharton's duct of Wyatt Pratt, in which calcareous concretions were coughed up, and also by my own case, in which the patient had an enlarged gall-bladder and had suffered from occasional attacks of gall-stone colic.

I have reviewed forty-five cases of calculus in the duct of the submaxillary gland, nine cases from the submaxillary gland, four cases of calculi which seem to have occurred in the sublingual gland, and four in its ducts. So the calculi are chiefly found in Wharton's duct, while they are very rare in the submaxillary gland and in the sublingual gland and its ducts. I may add that only a few cases of calculi have been found and reported in the parotis and Steno's duct in man, while a great many have been reported in animals. If to our number of cases, sixty-seven, we add the ninety-

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[1] INTERNATIONAL DENTAL JOURNAL, April, 1896.

three reports which we did not have at our disposal, the number of salivary calculi reported would sum up one hundred and sixty; and bearing in mind that these are the cases reported from the thirteenth century up to date, we must come to the conclusion that salivary calculus in human beings is a rare occurrence, even if we grant that there may have been cases in which the nature of the trouble was not recognized, and other cases which have never been published. Concretions were found in only three cases by Virchow, Closmadeux, and Malenfant, and they all occurred in Wharton's duct.

Men are affected about ten times as frequently as women.

The earliest age at which the symptoms have appeared was twelve years, and twice we find the age of seventy reported as the time of operation and relief, but from the twentieth to the fortieth year is the preferred time of life.

One calculus was found in fifty-five cases, ten calculi in one case, and a great many in one case.

The symptoms of calculi of the submaxillary gland and its duct may be classified as follows:

1. *Symptoms of the Initial Stage.*—Only in one case was this stage well marked by severe pains, caused by the entering of a mustard-seed (Roberts), which then caused the formation of a calculus.

2. *Symptoms of the Stage of Formation of a Stone and of its Growth.*—This stage may be passed through without any noticeable symptoms arising. Bruce reports a case in which a calculus existed for fourteen years without causing much inconvenience. Most patients on eating, especially if the diet be particularly tempting (Elston), will suddenly notice a swelling in the submaxillary region, which according to its degree may be more or less painful. On resting the mouth and pressing on the swelling the latter will disappear. Such swellings will also come and go with colds (Lister, Roberts). They appear in the submaxillary region, are of a hard consistency, and are also to be seen and felt at the floor of the mouth between jaw and tongue, pressing the latter upward and somewhat to the other side. In one of Hulke's cases the swelling seemed to be so firmly grown onto the hyoid bone that it was taken to be a fibroid. If the calculus is lodged in Wharton's duct, it can often be felt by the patient or the physician. Alston's patient complained of being unable to eat, of feeling a weight, and of having a rock in her mouth, while a patient of Freudenberg had noticed a calculus which projected and could be seen close behind the right

caruncula salivalis. The voice also may be affected. Clark, in speaking of a patient, says, "His voice, which had been harsh and coarse, after removal of the stone became flexible and resonant." Severe attacks of toothache, caused by the presence of a calculus, have also been observed at this stage, and Lister reports vertigo lasting from spring until August. Elston says, "The sympathy existing between the nerves of smell and taste was in my case most beautifully illustrated, for, according to the patient's account, he could never pass a savory smell without feeling a sudden enlargement of the submaxillary gland and pain, and he said he had dined but a few days previous to my seeing him on a meal which always used to make his mouth water, but which, in this instance, in consequence of the outlet of the duct being completely closed, had produced so violent a distention of the gland as to at once set up such a degree of active inflammation as shortly after led to the discovery of the nature of the disease."

3. *Symptoms of the Stage of Suppuration.*—Suppuration prepares for the expulsion of the stone, which in many cases is brought about by way of the duct or by way of a fistula, of which I find three cases reported, in one of which Nélaton extracted a calculus through a fistula. Such a suppuration may come suddenly, causing considerable swelling of the gland and the surrounding parts, great difficulty in swallowing and in mastication, impaired speech (Bonavert), facial pains (Rouyer), attacks of suffocation (Lister, Jessup), and in Oliver's case the opening of the mouth was prevented by the painful swelling. In short, this stage brings quite a variety of symptoms and a great deal of suffering to the patient, who soon seeks relief.

The stage of suppuration may, however, come and go several times, or it may become extremely chronic, as in Terrier's case, where chronic swelling and discharge of pus lasted for a long time.

Symptoms of Calculi in the Sublingual Gland and its Ducts.—Immisch (1891) considered the formation of calculi in the sublingual ducts improbable. Michel (1867) reported a case, which I have already mentioned, in which a fish-bone had pierced a sublingual duct, and then a stone had formed. And I think all doubts are removed by Dr. Verity's case, in which there was no difficulty in swallowing but great difficulty in mastication, much swelling in the mouth but very little to be seen in the submaxillary region, and while there may have been some slight compression of Wharton's duct, the stone could not have been lodged there, but must have been in the sublingual gland or one of its ducts; judging from

the shape of the stone and from the fact that it could be felt, I should say it was in a duct. As by far the most calculi are found in the ducts, the symptoms, together with the results of palpation and careful probing, will throw light on the case; the probing becomes especially useful if a calculus is located in the gland where it cannot be felt by palpation.

Modes of Procedure for removing Calculi.—Bonavert (1698) sent his man to the patient, and bade him tell him to try and break it (the tumor) with his finger, "which the man effected." J. W. Hulke (1872) made his way to an abscess cavity in the submaxillary gland, from the outside, tying the facial artery. All other operators have opened the abscess wherever they found it, or proceeded by way of the duct, cutting it open. Fenger anæsthetized his patient, cut the duct, and sewed it up again, while Marshall cut the duct and then dilated its lower portion with a slippery-elm tent.

In our sixty-seven cases, five single relapses occurred, while in another case three relapses were reported as occurring in the course of twenty years. In one of those cases the calculus is said to have grown within a year, but I would rather believe it had already been present when the other calculus was removed. Calculi had very probably been left in in some of the other cases also, and it seems as if real relapses were very rare, so that we may consider the prognosis to be good if at the time of operation all calculi present are removed. Other bad consequences, such as stenosis, etc., I have not found recorded.

The calculi reported measure up to six centimetres in length and five and one-half centimetres in width, and they have been found to weigh up to eighteen grammes (two hundred and seventy grains).

Their form is more or less cylindrical, oval or round, or more spindle-shaped. The surface has been found smooth, but usually it is somewhat uneven, very finely granulated or warty.

The color is generally a grayish-white or a yellowish-white, but it may also be brownish.

Their consistency is either hard or fragile.

The cut surface is generally lamellated, and Virchow, on examining microscopical cuts, found regular formations of homogeneous lamella and granular portions of yellowish-green color. In my own case the large calculus is only lamellated in its peripheral portions, while the central part shows an irregular configuration. This stone is from the gland itself, while the two others in the

original cases reported were from the ducts and lamellated throughout.

The specific gravity differs very much.

Chemical examination always shows the presence of phosphate of lime, and sometimes carbonate of lime. Malenfant made a quantitative analysis, finding—

	Per cent.
Phosphate of lime	27
Phosphate of magnesium	1
Basic phosphate of lime	60
Mucin insoluble in water, alcohol, and muriatic acid	4
Ptyalin	2
Loss	6
	100

According to nationality, I have found reported seventy-two cases from France; thirty-four from Germany; twenty-five from England, Canada, and Australia; twelve from America; four from Italy; and the others from different other countries. France has had by far the most cases, but I am at a loss to even indicate why this is so.

Altogether I have found one hundred and fifty-eight reports dealing with salivary calculi, and I may have overlooked others. I think it well to give all the bibliography which I have been able to gather, as I have not found a complete list of it anywhere.

	No. of Cases.
Before 1800	16
1800–1830	11
1830–1850	33
1850–1860	17
1860–1870	27
1870–1880	49
Since 1880	5
Total	158

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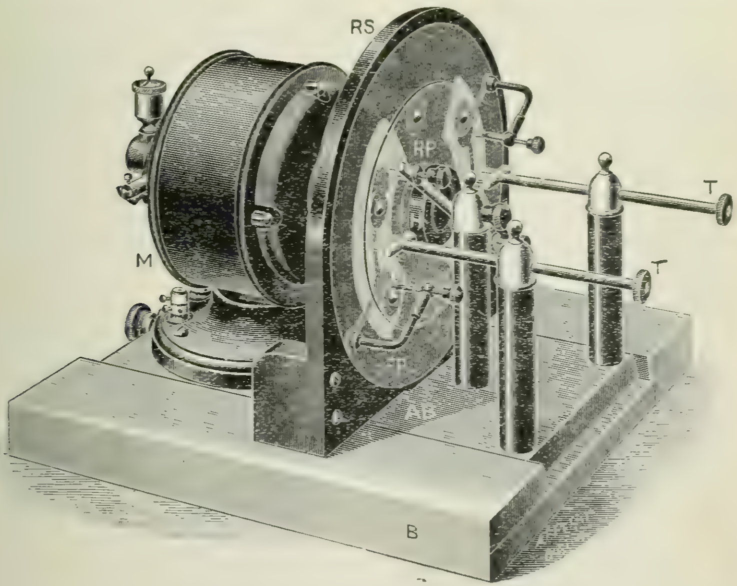
DIRECTLY CONNECTED STATIC MACHINES.

BY WILLIAM ROLLINS, BOSTON, MASS.

SINCE Röntgen's discovery static machines have assumed increased importance, because tubes excited by them give fine definition, which is of great importance, particularly in dental work.

As the voltage of static machines is not dependent on the size of the plates or on their number, it is practical to use small plates, obtaining the required quantity of electricity by increasing the speed of rotation. In applying this plan to the machines in the market several serious obstacles are met, chief among which are vibration and noise. These defects I overcome in the machines, one type of which is here figured. Select a shunt-wound motor



and place a variable resistance in the armature circuit so the speed can be regulated. Mount on an adjustable sliding support, *AB*, held in grooves on the base *B*, and movable by means of the milled head. This arrangement allows the distance between the plates *FP* and *RP*, to be changed. On the end of the armature-shaft is a hard-rubber hub, *H*, carrying the revolving glass plate *RP*. on the surface of which may be the ordinary metal buttons, or the surface

may be entirely without metal, or the buttons may be attached in an improved way to be hereafter described. *RS* is a hard-rubber support which is recessed for the fixed plate *FP*, and serves also to support the fixed brushes. This means of support was applied to the machine by Mr. Zeigler, and while it certainly protects the glass plate, I am not sure that the insulation is as perfect as with the ordinary form of support. Boring holes through the fixed plate to receive the arms which support the diagonal brushes (which is an invention of Philip Atkinson) is certainly a marked improvement on the ordinary method. The terminals, *TT*, are hollow to receive the ends of the conducting wires, which are securely held by the chucks shown.'

Every part of the machine should be insulated, and the edges of the plates rounded to prevent loss into the air.

Each revolving plate is balanced. As this is absolutely necessary for high speed, the method will be described in detail.

After the glass has been selected and the holes cut, each plate is mounted on a polished steel axis and placed between two horizontal polished strait edges. It is allowed to turn, the overbalanced portions marked, and the corresponding edges ground, until in whatever position the plate is placed it will remain stationary. Then the edges are rounded in order to prevent loss by convexion. In a charged plate the electricity collects at the edges and rapidly escapes into the air from all rough edges and corners.

When properly balanced, the plates are never true circles, as it is not practical to obtain glass of an even thickness of a suitable composition.

I grind the edges of the plates instead of the sides, for all glass appears to have a skin, which, if removed, weakens the material.

When a very powerful machine is needed, and plates larger than ten inches are used (at high speed) it is necessary to flatten the plates as well as to balance them. This is done in the following way: A disk of cast iron, three inches thick, a little larger than the plate, with one face plate, is placed in the furnace, with a plate on top, and slowly heated until the glass flattens. Iron and glass are then allowed to cool twelve hours.

Where sectors or buttons are used on the plates, the ordinary means of fastening with shellac may be improved upon by using platinum in thin pieces and fusing onto the glass by enamel at the time the plates are being flattened. Such sectors do not become detached. I shall figure an improved form of Wimshurst machine in the November number, as this type seldom reverses.

Summary of Improvement.—Direct connection with motive power; high speed to reduce size of machine; flattened plates to avoid vibration; balanced plates to avoid vibration; rounded edges to plates to avoid loss; platinum sectors or buttons fused to plates; covering parts with rubber to avoid loss.

THE APPLICATION OF THE PRINCIPLE OF CROWN-WORK TO METAL PLATES.

BY JOSEPH HEAD, M.D., D.D.S., PHILADELPHIA.

THE great difficuty in making gold dentures, when the teeth are ground to the plate, lies in the impossibility of grinding the teeth with sufficient accuracy to prevent an influx of food that will in time become foul. Although rubber attachments have to a certain extent lessened this objection to artificial dentures, still, when red rubber is used, its shrinkage from the porcelain and metal will invariably allow some small recess for leakage. And while pink rubber obviates the leakage to a great extent, the deterioration that invariably attends its prolonged presence in the mouth is a serious drawback.

My brother, Dr. L. F. Head, and I have been experimenting in this line for some years, and while our results are neither startlingly valuable nor original, still it would seem that we had solved the problem of making the porcelain lie absolutely against the gold of the plate. The ordinary process, as you know, is to strike up the plate, grind the teeth as closely to it as possible, back them, and solder the backing to the plate.

The variation from this would seem, now that it is done, comparatively simple. Instead of grinding the tooth to fit the articulation, it is ground accurately to the plate so as to be a trifle short. It is then backed up with a piece of thirty-two to thirty-four gauge annealed gold, which extends all the way between the plate and the porcelain to the cervical margin of the tooth. In burnishing this thin gold into the inequalities of the porcelain, the metal becomes springy and refuses to hug close to the tooth. When the backing has been trimmed to the size desired, it must be taken off and bent to an angle less than the angle made by the bottom and the side of the tooth, and when it is slipped in position again the gold and porcelain will lie snugly together everywhere.

Over this thin backing a thicker piece of plate is placed that covers the entire inside of the tooth, but does not extend between the plate and the porcelain, when the re-enforced backing can' be secured by bending, splitting, or riveting the pins, as the mechanic may see fit.

In preparing the case for investing, the tooth should be so cemented to the plate that all cement can be easily removed with a fine instrument after the investment has become hard; and all around the cervical margin where the tooth backing touches the plate, a fine paste of borax should be placed to prevent the soft investment from marring the perfect filling in of the solder. Great care must also be taken that the plate and backing be well cleansed and borax used before the tooth is cemented in position. The investment of plaster and sand, or plaster and marble-dust, as may be desired, must be flowed over the tooth and around the plate with all the care one would exercise in investing a rubber denture; for if spaces are left where the solder can pinch the porcelain, chipping will infallibly occur.

When the investment is hard, pick away the cement, place the solder in position, and heat up from underneath until the solder starts of itself to flow, when, with the aid of gravity and the pointed flame, the solder will run down underneath the tooth and fill all the spaces solidly.

Where a tooth stands alone on the plate, the well-known principles of crown-work are to be followed in their severe simplicity; but when three or four teeth are to stand together side by side, the following precautions are imperative:

Each tooth must be so isolated by investment as to make it impossible for the solder to flow from one to the other, and spaces must be left between the teeth so that the contraction of the plate on cooling will not crush them against each other. Sometimes it has been found advisable to slip small pieces of mica in between the necks of the teeth, but it must not extend up high enough to jamb in between the porcelain. Where the teeth would naturally touch small pieces of paper should be placed, which, burning out under the flame, give a space that, while it is ample for safety, is quite imperceptible in the mouth.

When a single tooth is to be surrounded by solder, just as a rubber tooth is by rubber, all angles should be ground off the tooth where the solder could possibly cause the backing to pinch the porcelain; the backing should be cupped and invested around the tooth everywhere the solder is expected to flow; then, prior to

splitting the pins, the backing is partially taken off and thin paper placed all around the edges between the metal and the porcelain. It is then slipped back into position and secured.

The tooth is then waxed to the case in the same way that one would wax a rubber case, care being taken not to flow the wax beyond the metal over the tooth.

This is then invested in the ordinary way, the wax boiled out, milk of borax wiped in with a brush, and the case is ready for filling in with solder, which is readily and safely accomplished if the heat is properly applied.

WHAT CAN WE DEMONSTRATE?

BY DR. G. A. MILLS, NEW YORK.

In the June number of the International Dental Journal, the writer, in criticising the omission of *practical* pathology in Professor Abbott's late book, adds, "Dental teaching to-day needs a work of this kind more than upon any other subject." The truth of this statement has been too apparent to need any comment. To prove this one has but to recall the fact of the multiplicity of methods of procedure in the department of the so-called "operative dentistry. What to do, and why do you do it? has had so little answer, it is no wonder that practice has so wofully wabbled in the past. In every department of life agnosticism is lifting her voice,—"How do you know?" Certainly, in the material world, demonstration is or can be made possible, and as truly so in the spiritual. In the material world the material eye can see what is demonstrated. Just as truly can the spiritual eye. How to arrive at these demonstrations is by a faithful following of teachings given in both departments. If a teacher cannot demonstrate his line of teaching we must recognize that he is unfitted for his part. Now, it is absurd to say that a line of uniformly successful dealing cannot be demonstrated. We use the word uniformly in an advisable sense. We do not hesitate to assert that all the lesions "*orally expressed by malnutrition*" (the *best* term that we have had in all this late *pyrotechnic* display covering the pages of our journals) are amenable to a (uniformly) successful correction, and *can be* demonstrated. There is no ambiguity in such a declaration; for if the one making it cannot prove it he falls.

Long experience ought to be a good teacher. It can be proved that the multitudinous methods that have been so elaborately presented to our calling are largely unnecessary ; for simpler ones are only needed (and far fewer ones also). The best knowledge is always the simplest. In view of these statements, it is easy to assert that no "practical pathology" will be placed in our hands except by following a continued line of practice taught and demonstrated over the patient, showing the conditions *then* and *now*, and then, and only then, will the controversy cease. When you have taught and demonstrated, that settles it.

We have long held to the thought that the only intelligent way to produce a practical work of pathology for dental practitioners would be to give a continued series of surgical clinics before a class of students, such clinics being given twice a week for a term of say six months; have a complete record noted down by a stenographer and give a printed copy of same to each student; they, observing the teachings and the results, would be fitted to enter into practice as no other class of students have ever been. The value of such a course of teaching could hardly be computed. From this would come a class of practitioners that could demonstrate to the public the importance of our services. From this course of teaching could be produced work of success. We assert that it is possible to give such a series of teachings.

PRESIDENTIAL ADDRESS OF DR. A. V. ELLIOTT, FLORENCE, ITALY.[1]

My Brethren,—On taking the presidential chair of this, the Florentine Dental Society of Italy, for the new term just commencing, allow me to express to you all my heartfelt thanks for the honor thus conferred upon me. I look upon this act on your part as a singular manifestation of good will, the more so—although I say it to my shame—that after all these years I have been among you I do not speak, as I should, your most pleasing and musical language. But, thanks to the kindness and courtesy of your worthy founder, I will be enabled to convey through him the expression of my gratitude and good-will towards you, and at the

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[1] Delivered before the Florentine Dental Society, Italy, February 26, 1896.

same time say a few words in regard to our enlightened and useful profession.

Not only are we ourselves an educated body of men in our specialty, but we are at the same time educators. A great responsibility rests with us in this respect. In regard to their teeth, the people are what the dentists make them ; and to a great extent the compliment is returned in the fact that the dentists are also to a great extent what the people make them. A class of people who are satisfied with, and even prefer, slovenly and cheap work to the best efforts of a dentist will, as a general thing, get slovenly and poor work as a result. Good work is not encouraged or appreciated by them, questions of pain, time, and pay being of more consequence than thorough and permanent operations. It follows, therefore, that, under the all-pervading law of least resistance, the general tone of the profession among such people is lowered ; so, in all seriousness, let me say that it is our *special* duty to society and to ourselves to do all we can to educate and enlighten those within our reach as regards the advantages to them of securing the best possible efforts from us professionally, and thus reap for ourselves such golden rewards as a higher standard of work would naturally command.

It is not because I am an American that I state the fact that the American people, as a people, take better care of their teeth than do any other people, but because it is a fact to which any one present who has had occasion to work in the mouths of Americans can bear testimony. The truth is that the American people, as a general thing, demand a higher excellence in the care of their teeth than any other; and they, by so doing, encourage and support the best efforts of the members of our profession, who in their turn, being thus encouraged and supported, do their best, by their work, teaching, and advice, to uphold the high standard thus demanded. In this the American dentist is aided by the fact that there is no social discrimination against him, for a dentist with us is as good as any one else, provided, of course, that he as a man *is* as good as any one else, and in consequence his influence has the importance it deserves.

It is not for me, an American, to claim any especial superiority for so-called "American dentistry." As a matter of fact, there is no such discriminating title as "American dentist" in America. All are simply dentists, be they good, bad, or indifferent. Only this, a good conscientious dentist is sure, sooner or later, to be found out and his best efforts stimulated by the higher prices he

can obtain for his work. There need be no limit for his ambition. It is all within himself. There is always "room at the top." Nor is it necessary, in my opinion, that a man should be born in America to be a good dentist, for, as a matter of fact, some of the best dentists in America, receiving the highest fees, are of foreign birth. In America, as in Italy, there is no prejudice against the foreigner. It is the *man*, not the country where he was born, which gives him success or failure. We look upon it as an advantage to have a mixture of races at our meetings, bringing with them the good things culled from the books and magazines of their own native lands. And in this connection I am glad to see that here, in old Italy, you, too, appreciate such advantages.

Abstracts and Translations.

SOME POINTS IN CONNECTION WITH THE BACTERIA OF THE MOUTH.[1]

BY J. W. WASHBOURN, M.D., F.R.C.P., AND K. W. GOADBY.

A KNOWLEDGE of the nature and functions of the bacteria found in the mouth is of the greatest importance both to dental surgeons and to medical men. To the dental surgeon it is of importance on account of the *rôle* played by bacteria in the production of caries and of various local affections, while to the medical man it is of importance in the study of the etiology of many infective processes, such, for instance, as diphtheria or scarlet fever.

We have been especially interested in the relation of the streptococci found in the mouth to those occurring in septicæmic conditions in the human subject. We have made a number of observations in this connection, and we venture, with some diffidence, on account of their incomplete nature, to bring our results before you to-night.

In the course of our investigations we have examined the mouths of a large number of healthy and sick individuals, so that we have obtained a fairly extensive practical knowledge of the bacteria of the mouth.

Any one who has studied this question will be struck with certain

[1] Transactions of the Odontological Society of Great Britain.

facts. In the first place, bacteria are found in all mouths, whether the teeth are sound or carious, and whether the individual is well or ill. Secondly, when the teeth are carious, there are generally many more bacteria present in the mouth than when the teeth are sound. Thirdly, in acute diseases more bacteria are present than in health. Lastly, a systematic cleansing of the teeth with the tooth-brush greatly diminishes the number of the bacteria present. An example which came under our notice well illustrates this point. We made a series of examinations of the mouth of a boy with sound teeth, on account of the number of spirilla which were constantly present. One day, to our surprise, the spirilla had completely disappeared, and on inquiry it turned out that the boy had taken to the use of a tooth-brush, as he was getting tired of the repeated examinations.

Cleansing of the mouth diminishes the number of bacteria, partly mechanically, and partly by removing *débris* of food and dead epithelial cells upon which the bacteria flourish. All the conditions which favor the retention of particles of food, such, for instance, as a close packing of the teeth, also favor the growth of bacteria.

An overgrowth of bacteria in the mouth is checked by certain natural processes. First, the saliva acts not only by mechanically removing the bacteria, but also in virtue of its bactericidal properties. Sanarelli has shown that fresh saliva destroys some bacteria and hinders the growth of others. In this respect it is similar to the blood serum and to other fluids of the body. Secondly, the cells which are contained in the lymphoid tissue of the tonsils act as phagocytes, englobing and destroying bacteria.

The importance of diminishing the number of bacteria in the mouth is due to the undoubted fact that caries is caused by their agency. It is well known that caries occurs most frequently in those who neglect their teeth. There are, no doubt, other causes which favor the production of caries, such as an imperfect development of the teeth, a deficient calcification, and so on; but these are only predisposing causes, and without the agency of bacteria caries does not occur.

The exact manner in which caries is produced appears to be the following: Bacteria multiply in various parts of the teeth where cracks or irregularities allow of the collection of particles of food. During their growth acid is formed and a decalcification takes place. The organic matrix of the tooth thus becomes exposed, and then serves as food for the bacteria; and a further formation of acid occurs, which again decalcifies fresh portions of the tooth. The

bacteria penetrate into the healthy structure through the dentinal tubes, and produce a lateral destruction of the elastin walls of the tubes and ultimately of the surrounding tissue, so that a large cavity may be formed with only a small external opening. Should the pulp cavity be reached, inflammation occurs and suppuration may ensue.

Caries must not be considered a specific process due to only one kind of bacterium. There are many species of bacteria which will produce caries, just as there are many kinds of bacteria which will produce inflammation and suppuration in various parts of the body.

We should only weary you by attempting to give a list of the species of bacteria that have been found in the mouth at one time or another by different observers. Many of these bacteria are only occasional visitors which have been introduced with the food or air. They remain for a short time in the mouth and then disappear, the conditions not being favorable for their development. When we consider the large number of species of bacteria contained in ordinary drinking water, it is no cause for surprise that systematic cultivations made from the mouth reveal the presence of many kinds of bacteria.

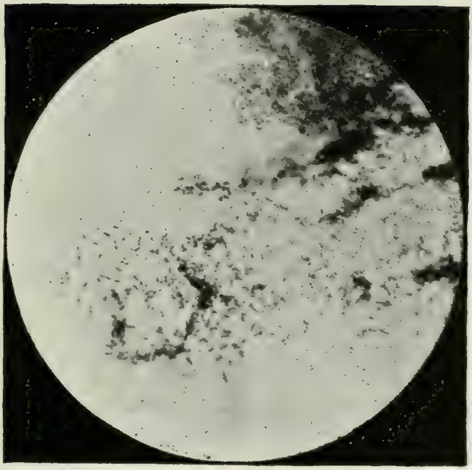
But apart from the bacteria that are, so to speak, accidentally present, the mouth contains certain species which constitute its normal flora. Some of the constant inhabitants of the mouth appear to be incapable of multiplying outside the body under the ordinary conditions of nature, and, indeed, some species have resisted all attempts at cultivation in artificial media. Some, on the other hand, can be cultivated in the various media generally employed.

On examining the different regions of the mouth certain species of bacteria are met with most frequently in certain localities. This localization is most apparent when the teeth are sound and the mouth systematically cleansed.

Scrapings from the mucous membrane of the cheek, especially in the region of the buccal sulcus, invariably show the presence of cocci generally arranged in pairs and often adherent to epithelial cells (*vide* Fig. 1). In perfectly healthy mouths these are often the only kind of bacteria seen on a microscopical examination. We shall refer to these cocci hereafter. Sarcinæ are often present in this region in unclean mouths and when the teeth are carious.

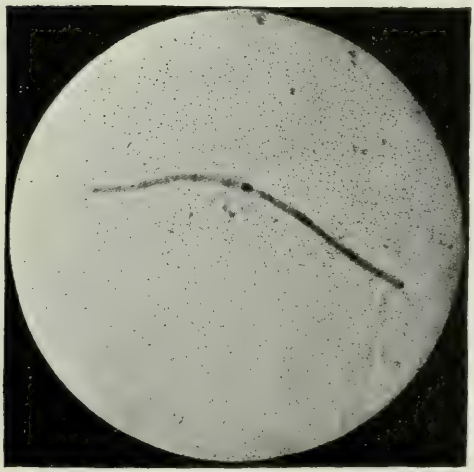
The space between the gums and teeth is a favorite spot for the growth of bacteria. Those which are most constantly present cannot be cultivated upon ordinary media. We believe that this is partially due to the fact that they are anaërobic, for under anaërobic

Fig. 1.



Diplococci in and around epithelial cell from normal healthy mouth (direct) × 1500.
(Outline of cell not very distinctly shown.)

Fig. 2.

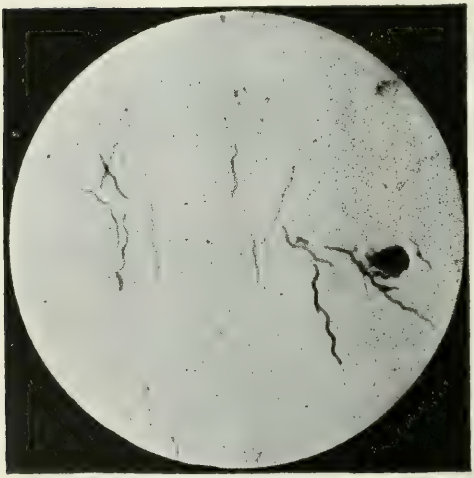


Bacillus maximus buccalis from healthy mouth (direct) × 1000.

Fig. 3.

Spirillum Sputigenum from healthy mouth (direct) × 1000.

Fig. 4.



Spirochæta Dentium from healthy mouth (direct) × 1000.

conditions we have obtained a growth of several species, but we have unfortunately not yet obtained pure cultivations. The species to which we refer are leptothrix innominata, bacillus maximus buccalis, jodococcus vaginatus, spirillum sputigenum, spirochæta dentium.

The *leptothrix innominata* consists of fine interlaced threads, forming felted masses. It is probably pleomorphous, and it is possible that it represents more than one species.

The *bacillus maximus buccalis* consists of large jointed bacilli which stain of a purple color with iodine and lactic acid (*vide* Fig. 2).

The *spirillum sputigenum* consists of curved rods, which when examined in the hanging drop are motile. Some interest attaches to this bacillus, because it was formerly considered by some observers to be identical with the cholera vibrio. Its inability to grow on ordinary culture media at once distinguishes it from the latter micro-organism (*vide* Fig. 3).

The *spirochæta dentium* consists of very fine corkscrew-shaped bodies slightly pointed at the ends, and staining faintly with the aniline dyes (*vide* Fig. 4). This spirillum looks very much like the flagella seen upon other bacteria. Indeed, we are still uncertain whether some of the spirilla forms met with in the mouth are not really flagella. In some of our specimens the fine spirilla appear to be attached to the spirillum sputigenum. By examining hanging drop preparations we are, however, quite satisfied that most of the fine spirilla forms are really bacteria, for they can be observed to possess independent motility. Similar fine spirilla have also been found in the evacuation of patients suffering from cholera, and in the intestinal contents of pigs. The spirochæta dentium was found by Netter in the pus from a case of putrid empyema.

We have isolated a bacillus which agrees in its microscopical appearances with that described by Miller as the *leptothrix buccalis maxima*, and which differs from the bacillus buccalis maxima in not staining with iodine and lactic acid.

Various chromogenic bacteria have been found in the mouth. Freund isolated eighteen different species. These bacteria are interesting because they are the cause of various pigments which occur upon healthy and carious teeth and on deposits of tartar.

Pathogenic Bacteria in the Mouth.—We now come to the interesting question of the presence of bacteria pathogenic to the human subject in the mouths of healthy individuals.

There is abundant proof that such an occurrence is by no means uncommon. The *diplococcus of pneumonia* has been found in a large

number of the cases in which it has been searched for. The best method of isolating it is to inoculate mice with saliva, and to make cultivations from the blood after death. This micro-organism is the cause of acute lobar pneumonia, and of some forms of pleurisy, cerebro-spinal meningitis, otitis, and other diseases in the human subject.

The *diphtheria bacillus* has also been found in certain cases. On several occasions one of the authors has found virulent diphtheria bacilli in the mouths of perfectly healthy individuals, or in patients convalescent from scarlet fever and with no symptoms of diphtheria. In one case it was present for several weeks in the mouth of a healthy individual.

Among the pathogenic bacteria that have been found from time to time in the mouths of healthy individuals, we may mention the staphylococcus pyogenes aureus and the streptococcus pyogenes; to the latter we shall presently revert.

The occurrence of pathogenic bacteria in the mouth is of great interest. It throws light upon the spread of disease, and shows how an apparently healthy individual may convey disease to another. This is one of the modes by which diphtheria is disseminated, and it is on this account that we meet with difficulties in attempting to eradicate the disease when it has once gained a foothold in an institution such as a large school. It, moreover, shows how carefully dental instruments should be disinfected after use. We cannot help feeling that sometimes sufficient care is not observed in this direction. It is not sufficient to rinse instruments in an antiseptic solution; they should, if possible, be placed for a few minutes in boiling water, there being no better way of sterilizing than this simple procedure.

But apart from these practical considerations, there is the theoretical question how a virulent bacterium can remain in the mouth without producing disease. This is, without doubt, due to the individual being immune. A bacterium only becomes pathogenic when it is virulent in relation to the susceptibility of the individual. The same bacterium may be harmless to one individual, and yet produce disease in another. For the production of disease two factors are necessary,—the exciting and the predisposing causes. The former, in infective diseases, is the bacterium, and the latter the susceptibility of the individual. If the individual is not susceptible, no disease is produced, and different persons vary in respect to susceptibility.

We will now discuss the question of the presence of *pathogenic*

streptococci in the mouth. The evidence is conflicting; some observers state that pathogenic streptococci are frequently present, others say they are seldom present, while a third series of observers maintain that a streptococcus is commonly found in the mouth which is non-pathogenic, and which is a different species to the pathogenic streptococcus.

We have made a number of observations in this direction. On making microscopical examinations of the secretion from various regions of the mouth, we have been struck with the frequent presence of masses of cocci. They are generally to be found on the tonsils and gum margin, and invariably on the mucous membrane of the buccal sulcus. We have found them present in the mouths of eighteen healthy individuals we have examined. These cocci are often found lying upon squamous epithelial cells (*vide* Fig. 1); as a rule, they are arranged in the form of diplococci, but sometimes short chains are to be seen. The individual cocci may be elongated, giving the appearance of short bacilli. Now, by making cultivations from the buccal sulcus where these cocci are always present we have invariably obtained cultivations of streptococci, which we have no doubt are the same as those seen in the microscopical preparations. That the cocci are arranged chiefly in pairs in the mouth and in chains in the cultivations is quite consistent with what we know of the morphology of streptococci.

The method we adopted is the following: A little of the scraping of the mucous membrane was removed with a platinum wire, and broth tubes were inoculated and incubated at 31° C. for twenty-four hours. At the end of this time the broth examined microscopically showed a growth consisting of diplococci, streptococci, and other bacteria. From the broth streak cultures were made on agar. Sometimes the resulting growth was a pure cultivation of streptococci, but generally other colonies also appeared; among these the most frequent were large crenated colonies of sarcinæ, especially in those cases in which a large amount of caries existed. Having obtained a cultivation on agar, pure cultivations could easily be obtained by inoculating a third series of agar tubes.

We have examined twenty-four mouths in all, sixteen with perfectly sound teeth, and eight with one or more carious teeth, and in every case streptococci were obtained in the cultivations. These observations show quite conclusively that streptococci are invariably present in the mouths of healthy individuals; they also show what care must be taken in coming to conclusions as to the signification of streptococci found in the mouth in disease. Many ob-

servers, in making bacteriological examinations of the exudation in diphtheria, lay great stress upon the presence of streptococci in addition to the diphtheria bacillus in the cultivation tubes, and they state that when many streptococci develop in the cultures the case is more severe than when the diphtheria bacillus only is present. Drs. Goodall, Card, and one of the authors have doubted this from their own observations; and the fact that streptococci are present in the normal mouth gives an explanation of these divergent results.

An exceedingly important question arises with regard to the relation of the streptococci found in the normal mouth to the streptococcus which is the cause of disease in the human subject. Is the streptococcus of the normal mouth a harmless saprophyte, which is only related to the streptococcus of disease by certain similarities, just as the hay bacillus resembles the anthrax bacillus? Or are the two micro-organisms varieties of the same species, which are capable under appropriate conditions of being mutually convertible? Can the normal streptococci of the mouth invade the body and produce disease under circumstances which lower the resistance of the body?

We will give a few examples to make these questions quite clear. In scarlet fever streptococci often invade the tissues of the tonsil, and may spread to the other tissues of the body, producing septicæmia or pyæmia. The streptococci cultivated from the resulting lesions are quite similar to the streptococci found in other septicæmic conditions, and possess a similar virulence when tested upon animals. It is a very enticing theory that the normal streptococci in the mouth have been enabled to invade the tissue of the body in virtue of the lowering of the resistance caused by the virus of scarlet fever, and that in their passage through the body they have increased in virulence. A similar example may be given in the case of puerperal fever, which is due to the invasion of the body by streptococci. Now, in the normal vagina streptococci are frequently present, and it is suggested that the lowering of resistance of the body during parturition has enabled these streptococci to invade the body,—that, in fact, a process of auto-infection has occurred. Such a view must be accepted with the greatest caution, on account of the bearing it has upon our views of the etiology and prophylaxis of infective diseases. It certainly does not agree with our knowledge of the etiology of puerperal fever, for this disease is generally conveyed by the introduction of micro-organisms from the outside by means of infected instruments or

the hands of the operator. The etiology of scarlet fever is also opposed to the same view.

Besides, wounds of the mouth heal very rapidly, and this we should hardly expect if the ordinary mouth streptococcus were identical with that of disease. On the other hand, operations about the mouth may be followed by a streptococcal pyæmia. A case of this kind was under the care of one of the authors. The extraction of a tooth was followed by signs of acute septicæmia, the patient only recovering after necrosis of the alveolus of the upper jaw. Such cases may be explained on the auto-infection theory just mentioned, but another explanation is possible. Virulent streptococci may have been introduced from the outside by infected instruments, or they may have been accidentally present in the mouth.

We have already alluded to the occasional presence of virulent diphtheria bacilli in the mouth, and there is no doubt that virulent streptococci are also at times present. Several observers have undoubtedly found virulent streptococci in the mouths of healthy individuals, but this does not prove that the streptococci constantly present in the mouth are of this nature.

Our own observations have led us to incline to the view of Lingelsheim, that the normal streptococcus of the mouth is a different species to that which produces disease in the human subject.

The question is an exceedingly difficult one to decide, and an analogous question arises in the case of cholera and diphtheria. Are the vibrios met with in drinking-water different species from the cholera vibrio? and are the xerous bacillus and Hoffman's bacillus different species to the true diphtheria bacillus?

We will say a few words about the relation of Hoffman's bacillus to the diphtheria bacillus, for we believe the question to be somewhat analogous to that concerning the streptococcus. Hoffman's bacillus is not infrequently found in normal mouths, and has, no doubt, in many instances been mistaken for the true diphtheria bacillus. It resembles it in cultivations, and to some extent microscopically, especially in old cultivations, when it may become clubbed like the diphtheria bacillus. It is not, however, pathogenic to animals, and can be distinguished from the diphtheria bacillus by the careful comparison of cultures made under similar conditions. It has never been converted into the true diphtheria bacillus by artificial means, and is probably a different species, belonging, however, to the same group. We have already stated

that the true pathogenic diphtheria bacillus may be present in the mouths of healthy individuals.

Now to understand the difficulties in distinguishing the normal streptococcus of the mouth from that of disease, we must say something of the varieties of streptococci found in various diseases in the human subject. Streptococci are the cause of erysipelas, pyæmia, puerperal fever, and a variety of other septic affections. The streptococci obtained from different cases of these diseases agree with one another in their main features, and have been grouped together by Lingelsheim into one species, called by him the streptococcus longus.

The general characters of this streptococcus are the following: It grows best at 37° C., but will grow at the ordinary temperature of the air. On agar and gelatin the colonies are minute and semi-transparent, the latter medium is not liquefied. The growth in broth is rather characteristic; flocculent masses stick to the sides and fall to the bottom of the tube, while the rest of the broth remains clear and transparent. A slight amount of acidity is produced in the cultivations. The microscopical appearance of the broth cultivations is characterized by the length of the chains, some consisting of as many as forty members. Hence the name streptococcus longus. In other media the chains are often much shorter, and in the tissues of infected animals only diplococci forms may be met with.

These are the main characters of the streptococcus longus, but cultural and microscopical differences are to be observed in the micro-organisms obtained from different sources. For example, broth may be rendered uniformly turbid, instead of presenting the characteristic growth above described. Differences in virulence in animals have, however, been looked upon as the most important point of distinction between pathogenic streptococci obtained from different sources. The streptococcus of erysipelas has been distinguished from the streptococcus pyogenes by being more virulent to rabbits than to mice.

The test of virulence is, however, very fallacious, as will be shown by the following experiments. We obtained streptococci from the following sources: (1) a case of suppurating knee-joint in a man; (2) a fatal case of pyæmia in a child; (3) a severe case of phlegmonous erysipelas in a woman; (4) an abscess from a horse. One cubic centimetre of a twenty-four hours' old broth from each case was injected into the peritoneal cavity of a rabbit, and a large loopful of a twenty-four hours' old agar cultivation from each case

was inserted under the skin of a mouse. In none of the cases obtained from the human subject were the animals affected, while the rabbit, inoculated with the cultivation from the horse, died of septicæmia in twenty-four hours, and the mouse in two days.

Almost all observers have noted a great difference in the virulence of streptococci to animals even when taken from apparently similar cases in the human subject.

Marmorek has shown that streptococci obtained from various diseases in the human subjects, although differing initially in pathogenic effects on animals, can, nevertheless, be raised to the same pitch of virulence by repeated passages and cultivation in special media. He consequently looks upon the streptococci pathogenic to the human subject as all simple varieties of the same species which can be converted into one uniform type by appropriate means.

Lingelsheim was the first to point out that the streptococcus obtained from the normal mouth differed from the streptococcus longus in three points. It was not pathogenic to rabbits or mice; it rendered broth turbid, and the chains in this latter medicine were shorter than those of the streptococcus longus; and it caused slight liquefaction of gelatin. He considered it a distinct species and called it the streptococcus brevis.

His observations have been confirmed by some investigators, while others have disputed his view. We have made a careful series of cultivation and inoculation experiments with streptococci obtained from the mouths of three healthy individuals, and have compared them with streptococci obtained from cases of pyæmia and phlegmonous erysipelas.

The details of the experiments we will not weary you with, but will only give you the main results. The streptococcus from the normal mouth differs from the streptococcus longus in the following points: (1) It is non-pathogenic when tested upon rabbits and mice; but we have already stated that this test of virulence in the case of streptococci is not very conclusive. (2) It produces a uniform turbidity in broth cultivations. (3) It clots milk and produces much more acid than the streptococcus longus. (4) The individual cocci are smaller, and the chains, especially in broth cultivations, shorter. The length of the chains is not always a reliable criterion. Sometimes in the impure cultivation obtained from the mouth the chains are very long, and this is probably due to the medicine being altered in composition by the other bacteria present.

We have not been able to confirm the observations of Lingelsheim that gelatin is liquefied.

Slight differences have been observed in the streptococci we have examined. Two of them grow more slowly in the cold than the other and present somewhat different microscopical appearances. The cultivations we are passing round illustrate these different points (*vide* also figures).

The conclusions which we draw are these: The streptococcus occurring normally in the mouth agrees with the streptococcus brevis of Lingelsheim, and can be distinguished from the streptococcus of disease by its biological and morphological characters. It must be looked upon as a distinct species for the present, although ultimately this view may be proved incorrect, for it is possible that further researches may enable us to convert the streptococcus brevis into the streptococcus longus. This, however, has hitherto not been accomplished. We think that the discrepancies of different observers who have investigated the streptococci of the mouth are partially due to the fact that the streptococcus longus is sometimes accidentally present and has been mistaken for the normal streptococcus of the mouth.

Reports of Society Meetings.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The Thirteenth Annual Meeting of the National Association of Dental Faculties was held at the Grand Union Hotel, Saratoga Springs, commencing August 1, 1896.

The following colleges were represented:

Birmingham Dental College.—T. M. Allen.

University of Denver, Dental Department.—W. E. Griswold.

Columbian University, Dental Department.—H. C. Thompson.

National University, Dental Department.—J. Roland Walton.

Atlanta Dental College.—Wm. Crenshaw.

Southern Medical College, Dental Department.—Frank Holland.

Chicago College of Dental Surgery.—T. W. Brophy and Louis Ottofy.

Northwestern College of Dental Surgery.—L. L. Davis.

Northwestern University Dental School.—Theo. Menges and Geo. H. Cushing.

Indiana Dental College.—G. E. Hunt.

Louisville College of Dentistry.—Francis Peabody.

Baltimore College of Dental Surgery.—B. Holly Smith.

University of Maryland, Dental Department.—F. J. S. Gorgas.

Boston Dental College.—J. A. Follett.

Harvard University, Dental Department.—Thos. Fillebrown.

University of Michigan, Dental Department.—J. Taft.

Detroit College of Medicine, Dental Department.—G. S. Shattuck.

University of Minnesota, College of Dentistry.—Thos. E. Weeks.

Kansas City Dental College.—J. D. Patterson.

Western Dental College.—D. J. McMillen.

Missouri Dental College.—A. H. Fuller.

University of Buffalo, Dental Department.—W. C. Barrett.

New York College of Dentistry.—Frank Abbott.

Cincinnati College of Dental Surgery.—W. T. McLean.

Ohio College of Dental Surgery.—H. A. Smith.

Cleveland University of Medicine and Surgery, Dental Department.—S. B. Dewey.

Western Reserve University, Dental Department.—H. L. Ambler.

Pennsylvania College of Dental Surgery.—C. N. Peirce.

Philadelphia Dental College.—T. C. Stellwagen and S. H. Guilford.

University of Pennsylvania, Dental Department.—E. C. Kirk.

University of Tennessee, Dental Department.—J. P. Gray.

Vanderbilt University, Dental Department.—H. W. Morgan and W. H. Morgan.

University College of Medicine, Dental Department.—L. M. Cowardin.

Royal College of Dental Surgeons of Ontario.—J. B. Willmott.

The following colleges were elected to membership:

Howard University, Dental Department, Washington, D. C.—James B. Hodgkin.

Marion Sims College of Medicine, Dental Department, St. Louis, Mo.—J. H. Kennerly.

Dental Department of Tennessee Medical College, Knoxville, Tenn.—R. N. Kesterson.

The following applications for membership were reported favorably by the Executive Committee for final action next year:

University of Omaha, Dental Department, Omaha, Neb.; Ohio Medical University, Dental Department, Columbus, O.; Baltimore

Medical College, Dental Department, Baltimore, Md.; Dental Department of Milwaukee Medical College, Milwaukee, Wis.

The New York Dental School announced its intention to complete its application next year.

The report of the secretary stated that there were in the United States fifty-three institutions teaching dentistry or conferring the dental degree, as follows: Dental schools in active operation, forty-six; organized during the year, two; in course of organization, one; corporations conferring the dental degree, four. Of the dental colleges, thirty-six were now members of the Association, eight had applications for membership pending, two had signified their intention of applying, and the two newly organized have announced in their catalogues their intention to comply with the rules of the Association.

The report of the Committee on Schools, presented by its chairman, Dr. Follett, stated that reports had been received from thirty-five schools as to their equipment under the resolution adopted last year. These reports showed that the schools were well provided with lecture-rooms, and in most instances with ample laboratory and dispensary accommodations, with sufficient and appropriate appliances. They indicate a broadening in the general course of instruction, as well as fuller courses in all departments. Several colleges have recently added courses in bacteriology and extended their work in histology and pathology in practical ways. During the year 1895–96 the number of matriculates at the thirty-five colleges reporting was five thousand five hundred and thirty-two; graduates, one thousand three hundred and sixty-three.

Mr. Melville Dewey, secretary of the Board of Regents of the University of New York, appeared before the Association by invitation of some of the members, and gave a masterly address on the needs of the movement for higher education in professional ranks. Incidentally, Mr. Dewey explained some of the details of the system pursued in New York, and stated that, greatly to the surprise of those in charge of the various professional educational institutions in the State, the number of students had steadily increased since the higher requirements had been put into force by the Board of Regents.

Among the more important legislation enacted by the Association were the following:

REGULATING THE ADMISSION OF STUDENTS.

Preliminary Examination.

The following preliminary examination shall be required of students seeking Admission to colleges of this Association.

—— ——— High School.
———— 189

To the Faculty of ————
M —— —— desires to present ——self as a candidate for admission to the Course of Dentistry, —— ——
He has pursued in this school the branches against which numbers appear,—the numbers being the standings upon a scale of 100. Our course requires five recitations or exercises weekly, in each branch. Our terms are ten weeks in length.

PRELIMINARY.

2 terms Orthography, standing.
2 terms Reading, standing.
2 terms Writing.
2 terms Arithmetic.
2 terms Geography.
2 terms Grammar.
2 terms History United States.
—
14

These are required in all cases, and fourteen counts given for the same.

ELECTIVE.

3 terms University Algebra, through Quadratics.
3 terms Geometry, plane and solid.
2 terms Physiology.
2 terms Physical Geography.
1 term Botany, with analysis of forty plants.
3 terms General History.
3 terms Natural Philosophy.
3 terms English Literature.
2 terms Civil Government.
2 terms Rhetoric.
2 terms History of England.
3 terms American Literature.
3 terms Chemistry.
1 term Commercial Arithmetic.
2 terms Astronomy.
2 terms Geology.
2 terms Natural History.
1 term Political Economy.
2 terms Drawing.
3 terms German.
3 terms Greek.
3 terms Latin Reader, Cæsar.
3 terms Cicero, four orations.
3 terms Virgil, six books.
1 term Book-Keeping.
3 terms French.
3 terms Manual Training.

(After session of 1901–1902 United States History becomes elective, and entitles to two credits.)

FOR THE SESSION OF 1897–98.

	Counts.
Preliminary	14
Elective	18
Total	32

FOR THE SESSION OF 1898–99, 1899–1900.

	Counts.
Preliminary	14
Elective	27
Total	41

FOR THE SESSION OF 1900–1901.

	Counts.
Preliminary	14
Elective	36
Total	50

For the session 1901–1902 and thereafter no preliminary credits; forty-eight credits from the studies classed as elective.

When the text-book mentioned has not been completed, the exact amount of work done should be stated.

The candidate above named is recommended as of good moral character, studious habits, and, judging from past records, able to carry forward the work of a dental college course.

The rules for the admission of students take effect with the session of 1897–98.

—— —— Principal.

ADMISSION TO ADVANCED GRADES ON CERTIFICATES.

The colleges of this association may receive into the advanced grades of juniors and seniors only such students as hold certificates of having passed examinations in the studies of the freshman or junior grades respectively, such certificates to be pledges to any college of the association to whom the holders may apply that the requisite number of terms have been spent in the institutions by which the certificates were issued.

INTERMEDIATE CERTIFICATE.

Place Date

This certifies that ———— has been a member of the ———— class in the ———— during the term of ————

He was examined at the close of the term in the required studies, as stated herein, and is entitled to enter the

Freshman Year.	Junior Year.
[List of Studies.]	[List of Studies.]

This certificate shall by correspondence be verified by the dean of the college by which it was issued. Without such certificate no student shall be received by any college of this Association for admission to the advanced grade, except on such conditions as would have been imposed by the original school, and these to be ascertained by conference with the school whence he came.

LIMITING THE TIME FOR THE RECEPTION OF STUDENTS.

No member of this Association shall give credit for a full course to students admitted later than ten days after the opening day of the session, as published in the announcement.

In case one is prevented by sickness, properly certified by a reputable practising physician, from complying with the foregoing rule, the time of admission shall not be later than twenty days from the opening day.

In cases where a regularly matriculated student, on account of illness, financial condition, or other sufficient cause, abandons his studies for a time, he may re-enter his college at the same or subsequent session, or where under similar circumstances he may desire to enter another college, then with the consent of both deans he may be transferred, but in neither case shall he receive credit for a full year unless he has attended not less than seventy-five per cent. of a six months' course of lectures.

ATTENDANCE, EXAMINATIONS.

Attendance upon three full courses of not less than six months each in separate academic years shall be required before examination for graduation. The year shall be understood to commence August 1, and end the following July 31.

Beginning with the session of 1896–97, the examinations conducted by the colleges of this Association shall be in the English language only.

A student who is suspended or expelled for cause from any college of this Association shall not be received by any other college during that current session. In case the action of the first college is expulsion, the student shall not be given credit at any time for the course from which he was expelled. Any college suspending any student shall at once notify all other members of this Association of its action.

APPLICATIONS FOR MEMBERSHIP.

Applications for membership in this Association shall be made in writing, favorably indorsed by the faculties of two or more colleges of the Association and the Board of Dental Examiners of the State in which it is located.

Such application shall then be referred to a special committee of three which shall be appointed by the chair upon each application. The duty of this committee shall be to visit the school applying during its session, personally examine its facilities for teaching, methods of instruction, and efficiency of the faculty, and report to the Executive Committee, which report shall, if favorable, be acted upon.

Each application shall be accompanied by a sum of money sufficient to defray the expenses of the special committee.

The constitution was so amended that hereafter it will require a two-thirds vote instead of a majority to elect new members.

The following resolution, offered by Dr. Peirce, was on motion adopted:

WHEREAS, In view of various reports frequently being circulated derogatory to the character of certain schools without any one being willing to prefer charges sustaining such statements.

Resolved, That the Executive Committee be and is hereby authorized to exercise full power to investigate all such innuendoes or charges by visiting the school or schools, or authorize some one to perform this duty; summoning witnesses, etc., in order that all such statements shall be sustained or proved false.

Resolved, That a sum to be determined by the officers, president, secretary, and treasurer, be and is hereby appropriated for the purpose of paying expenses essential to the carrying out of the provisions of the above resolution.

The following communication from the National Association of Dental Examiners was read and on motion adopted:

Resolved, That this Association requests the National Association of Dental Faculties to enact a rule prohibiting colleges from receiving beneficiary students recommended by State boards and associations.

The following, offered by Dr. Abbott, was adopted:

Resolved, That the committee of three appointed by the chair to report on applications for membership shall determine and report to this Association at its next meeting the minimum requirements of such colleges as desire to become members of this Association as to length of course, plant, equipment, facilities for teaching, and the number and efficiency of its faculty.

Dr. Brophy offered the following, which was adopted:

Resolved, That a graduate of a recognized dental college, who applies to a college of this Association for the degree of Doctor of Dental Surgery or Doctor of Dental Medicine, shall complete one full course of instruction in said college and comply with all other requirements of the senior class.

The following lie over till next year for final action:
Offered by Dr. Barrett:

Resolved, That after the regular session of 1897–98 the annual college term for the members of this Association shall be seven full months.

Resolved, That it is advisable that the National Association of Dental Faculties in future meet in connection with the National School of Dental Technics at a time of year when the colleges are in session, and before the time for the issuance of the annual catalogues.

A committee, consisting of Drs. Patterson, H. W. Morgan, and Kirk, appointed to consider the advisability of adopting the academic cap and gown for commencement day, reported in favor of adopting the intercollegiate system and in favor of lilac as the distinguishing color for dental schools. Laid over till next year.

The following were elected officers for the ensuing year: J. P. Gray, Nashville, Tenn., President; Truman W. Brophy, Chicago, Vice-President; Louis Ottofy, Chicago, Secretary; Henry W. Morgan, Nashville, Tenn., Treasurer.

Executive Committee.—J. Taft, Cincinnati; Thomas Fillebrown, Boston; B. Holly Smith, Baltimore, Md.

Ad Interim Committee.—H. A. Smith, Cincinnati; Thomas E. Weeks, Minneapolis; J. D. Patterson, Kansas City, Mo.

The newly-elected officers were installed, and the president announced the standing committees as follows:

Committee on Text-Books.—S. H. Guilford, Philadelphia, Pa.; J. B. Willmott, Toronto, Canada; Theodore Menges, Chicago, Ill.; L. M. Cowardin, Richmond, Va.; James Truman, Philadelphia, Pa.

Committee on Schools.—J. A. Follett, Boston, Mass.; G. E. Hunt, Indianapolis, Ind.; C. N. Peirce, Philadelphia, Pa.; A. H. Fuller, St. Louis, Mo.; D. J. McMillen, Kansas City, Mo.

Adjourned.

AMERICAN DENTAL ASSOCIATION.

August 4, 1896.—First Day.—Morning Session.

The Thirty-sixth Annual Meeting of the American Dental Association was held at Saratoga Springs, N. Y., commencing August 4 1896.

The meeting was called to order at 11.25 by the president, Dr. J. Y. Crawford, and was opened by prayer by Dr. W. H. Morgan, of Nashville, Tenn.

Upon motion the call of the roll of membership and reading of the minutes of the last meeting were dispensed with.

The secretary announced the resignation of Drs. Gillette and Ames, which resignations were accepted. The secretary also read a communication from the Indiana State Association, stating that Dr. Cravens has been restored to membership in that society. A communication was read from Mrs. J. J. R. Patrick, widow of Dr. Patrick, enclosing bill for expenses incurred by Dr. Patrick in the examination of crania for this society.

Dr. Peirce.—As the Finance Committee of this society is quite familiar with the work of Dr. Patrick, I move that this matter be referred to them for action.

Motion carried.

Dr. Cushing read the report of the Publication Committee, in which attention is called to the delay in publishing the transactions, as the copy was in the hands of the publishers on October 28, 1895. The committee suggest that some arrangement be made with the publishers guaranteeing the publication of the transactions by the month of January following the meeting of the Association. The committee also presented a bill for expenses incurred.

Motion made that report be received and the suggestion therein approved.

Dr. Crouse.—As this is a question that has never arisen before, I think it would be wise for the Association to turn the matter over to the Executive Committee, to make definite arrangements. It may be that we are not in a position to dictate absolutely such terms as these. The question came up before the Executive Committee last night. It was suggested there that, when the sections are made up, if the corresponding secretary would then have the lists printed and sent to each member, that that would obviate a great drawback, which is that the sections do not know where their proper places are, and their reports do not come in properly. The Executive Committee should, of course, make the best terms they can with the publishers, but I do not know if they can dictate to them just when they are to be printed.

Dr. Morgan.—I think six months' time is plenty in which to print the transactions. I myself am connected with a publishing house, and we could get it out in six weeks; so I think we ought to get the transactions much earlier.

Dr. Cushing.—I want to say a word in regard to what Dr. Crouse said, and that is that the original proposition, which came from the publishing house that has done the work for many years, fixes the time itself, and it is very much shorter than they have taken to publish the transactions.

Dr. Crouse.—We give the parties the material as a compensation. If you insist upon the proceedings coming out all at once, you will not be able to make such good arrangements.

Dr. Peirce.—I am somewhat familiar with the action of the publishers. Those of you who have seen the copy already out must have noticed a great many very fine illustrations. They have been prepared at much expense and a great deal of time, and that may be offered as some apology for the time taken by the publishers.

Dr. Boice.—I would move that it be referred to the Executive Committee.

Dr. Smith.—It seems to me, before any definite action is taken,

both sides should be heard. I have not heard any reason for the delay. If there are good reasons for it, we would like to know. If the transactions are published in the condition they are now, we cannot expect them as early as if we published them ourselves. If the transactions are necessarily delayed, the difficulty could be obviated by the manner suggested by Dr. Crouse,—that we have the organization of the sections earlier.

Dr. Boice.—About six weeks ago the transactions of the last meeting were published. They must have spent at least one thousand dollars in the publication, and if we had published them, it would have cost us at least fifteen hundred dollars.

Dr. Boice's motion seconded and carried.

The report of the corresponding secretary was read. In it Dr. Chase states that she has received no letters of importance during the past year. Letters of inquiry have been answered, and blank certificates for delegates to the meeting have been sent to all societies requesting them. Bill for postage and stationery accompanying this report, one dollar.

Report received.

REPORT OF THE TREASURER.

Balance on hand	$606.93
Collected at Asbury Park	1244.90
	$1851.83
Paid out during the year	572.55
Balance	$1279.28

The expenditures were as follows:

Secretary's salary for 1894–95	$200.00
Treasurer's salary	100.00
Reporter for session of 1895	125.00
Expenses of corresponding secretary	15.00
Chairman of Section I.	7.50
Chairman of Section II.	2.50
Chairman of Section VII.	15.60
Expenses of chairman of Executive Committee	32.50
Printing Dr. Patrick's report	30.00
Chairman Publication Committee	30.00
Printing, stationery, postage, and expressage	14.45
	$572.55

Dr. Donnelly reported on behalf of the Committee on the Army Medical Museum. He stated that the museum contains more than

thirty-five thousand specimens, and is open to the public. Its dental section may be made its most attractive department, and the greatest object lesson of its kind. A number of valuable and beautifully mounted specimens have recently been acquired, most of which are rare, many of which illustrate the effect of diseases of the maxillary bones and teeth. Many of the State and local societies have appointed auxiliary committees to act with this committee. It is impossible to detail the kind of specimens desired, but anything illustrative of any part of the subject of dentistry, which would throw light on the etiology or pathology of the teeth, jaws, etc., would be of great value. It is impossible to say in how many ways such a great depository as this museum reaches and teaches the thousands of intelligent and advanced students who come from everywhere, and return and impart the information acquired to others. The committee recommends,—

1. The appointment of five members of the Association as a National Committee, charged with the duty of building up a great national museum.

2. That the society recommend the appointment of auxiliary committees.

3. That one hundred dollars be appropriated and used with other donations in defraying the expenses of the National Committee.

The report was referred to the Executive Committee.

The president called for a report from the committee appointed to look after the question of introducing into the medical examination some inquiry as to the condition of the oral cavity in reference to the question of life insurance. The committee, not being ready to report, was passed for the present.

The president also called for reports from the Committee on the Priority of Invention of Dental Furnaces, and the Committee on the Union of the American Dental Association and the Southern Dental Association; both committees will report at a later session.

Dr. Fillebrown, however, stated, in reference to the committee as to the union of the two societies, that the matter has been considered, in connection with the Southern Dental Association, several times during the year, and the results are these: The Southern Dental Association appointed a committee last fall, at Atlanta, to confer with our committee, and last week they held a meeting at Asheville. They have decided to meet at Old Point Comfort on the first Tuesday of August, 1897, and they express the hope that it will be agreeable to have the American Dental Association meet

there also at that time. I understand that the president and officers are empowered to consider some other place, if it be thought desirable. We have called a committee meeting for later in the day, and we will make another report.

COMMITTEE ON STATE AND LOCAL SOCIETIES.

Dr. Crouse.—Dr. Kirk explained to me last night that he had not had time to attend to the work as he wished to. He asks to be relieved from that committee, and have some one put in his place who could attend to it. I would like to have the report postponed for another time, as I wish to bring it up in another form.

COMMITTEE ON REVISION OF CONSTITUTION AND BY-LAWS.

Dr. Fillebrown.—The committee has had no meetings this year, and no correspondence. The time did not seem to have arrived for it. Later in the session probably there will be another report.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. Crouse.—After Saratoga was selected last year as the place of meeting for this year, we appointed a local committee, and asked them to come here and investigate the place, and see where we could hold the meeting. The local committee decided on this hotel as furnishing the best accommodations for our meetings and meeting-room.

In regard to the programme, it will be remembered that at the last session this Association passed a resolution having in view more section work and less general meetings,—that is, having but one session a day, and having the work done in the sections. Several difficulties arose in that matter, growing out of the fact that the sections were not well organized this year. I wrote to the different chairmen to see what their preference was, and I found all the sections opposed to trying to adopt it this year, and the Executive Committee took it upon themselves to disobey that resolution, on the ground that we could not perfect the arrangements, and we therefore left these as they were last and previous years.

We offer this printed programme as the programme for the session. I might mention that Section I. wanted to carry out the resolution of last year as to section meetings, but the others did not.

Report adopted.

The second vice-president, Dr. Fillebrown, then took the chair

while the president, Dr. J. Y. Crawford, read his address, an abstract of which follows:

Notwithstanding the great financial depression and much agitation in our country, considerable progress in our profession has obtained within the last twelve months, which it would be interesting and instructive at this time to relate and emphasize, but as there are other matters that more directly affect the future welfare of our vocation and the good of the whole people, I have concluded to call your attention to the question of dental jurisprudence, or the legal enactments governing or regulating the practice of dental surgery in the United States.

First, I will say that any enactment placed upon the statute books of our common country, or any of the independent States of our common country, should rest upon the immutable principle of equal justice to all and exclusive privileges to none.

Secondly, All laws that are intended to control the conduct of an individual or individuals in regard to any definite and universally uniform question in all of the States, should be absolutely the same in all particulars.

Thirdly, All such laws should be so plain and simple in their construction that the humblest citizen could comprehend them, and if necessary, administer the same in case he should be called upon so to do by the suffrage of the people.

Fourthly, The penal feature should be so well marked and imperative that none would dare disregard, only at their peril. Upon this feature, more than any other perhaps, depends the efficiency of all laws.

Fifthly, Each State should have the same enactments controlling the matter of dental education, making the requirements for graduation uniform in every particular, thus holding dental colleges up to a higher and better standard.

Sixthly, The first registration of an individual to practise should be made within twelve months after receiving a diploma from a regular dental institution of learning. The second or subsequent registrations in any other State of the Union should depend upon the presentation of a certificate from the State Board of Dental Examiners, that the individual held a diploma from a reputable dental college, and that he had engaged only in the reputable practice of dental surgery while remaining a citizen of the State in which he first registered.

Finally, the above synopsis, with other minor details, such as the regulation of fees and penalties, and the designation of proper

tribunals to have jurisdiction over the questions involved, should make up the sum total of all that is embraced in the subject of dental legislation, in this or any other country.

In order that this may be accomplished, I would respectfully suggest that this Association appoint a committee of one member from each State, and that the National Association of Dental Examiners be requested to appoint one member from each State; also the Dental College Faculty Association be requested to appoint one member from each State having a dental college or colleges, to be known as a general legislative committee, whose duty it shall be to formulate and draft such a uniform law as could not fail to be satisfactory to all the States. That would result in the accomplishment of the most good, not only to the profession but to the public at large. That such committee be requested, through its representatives in the various States, to have this uniform law presented as nearly simultaneously in all the States as possible, and that this national organization, by resolution, unanimously request the hearty co-operation and support of the entire profession in the Union.

This work is of so much magnitude and fraught with so much interest to all departments of dental science and dental institutions in this country that it cannot be accomplished within a short period of time. Hence this legislative committee should be selected with great care, in order that there may be as little friction as possible, since the cavilling and contention by the profession over features of minor importance has been the greatest obstacle in the way of obtaining proper legislation for the practice of dentistry in this country.

This uniformity of laws is one of the reasons that could be offered at this time for creating out of the two organizations that are now in existence—to wit, the American Dental Association and the Southern Dental Association—one national organization, to be known by such name as would be appropriate and proper.

I would call your attention to this additional fact,—in order to stimulate discussion and action upon this important matter,—that there are many good and reputable citizens now engaged in the practice of dental surgery—and general medicine, so far as that is concerned—in some States of the Union who are deprived of citizenship in their States by virtue of the improper construction and requirements of the laws of certain States of this Union, virtually disfranchising them to a certain extent.

In view of the interest manifested in the matter of uniting the American Dental Association and the Southern Dental Association,

I would respectfully advise that our next meeting be held at Old Point Comfort, at the usual time, as the Southern Dental Association has adjourned to meet at that time and place, and they have expressed the thought that it would be fully agreeable to have our Association do likewise, in order that a full and free discussion of the question of consolidation be finally and permanently settled. Further, I would suggest that in case the consolidation cannot be accomplished, that this Association hereafter hold its annual meetings in the three grand divisions of our country,—to wit, the Northeast to have one meeting, the Northwest to have one meeting, and the South to have one meeting, thus alternating every year in order that the entire country may have the benefit resulting from this Association.

Since our last meeting, we have lost by death the following members: Dr. W. H. Dwinelle, of New York; Dr. P. G. Hunt, of Indiana; Dr. C. W. Spaulding, of Missouri.

I would respectfully call special attention to the reports of your committee on the work of the National Museum, in connection with the Army Medical Museum at Washington. The progress of the work of that committee seems to be satisfactory, and all that could be desired. As to their recommendation for an appropriation, I respectfully refer the whole matter to you as a body, and I would further suggest that the full report of this committee be published in our annual proceedings, in order that as much information may be disseminated upon this subject as possible.

The president's address was received and placed in the hands of the Publication Committee.

Dr. Morgan.—I move that it be referred to a suitable committee to take into consideration the suggestions therein contained.

The chair appointed Drs. Morgan, Brackett, and Fuller, as such committee.

Dr. Crawford then resumed the chair.

On behalf of the Committee on Credentials, Dr. Jackson read the list of delegates who have presented certificates.

Report received.

Dr. Peirce.—I would like to give notice that any one having a voluntary essay will please hand it in at an early date.

Dr. Horton.—I would like to make an announcement, if it is in order: Five years ago I announced that my son had perfected a process by which sensitive dentine could be excavated without pain. It was received at that time with an expression of doubt, but a promise was made that as soon as an apparatus could be made that

would be safe to put into the hands of the members of this Association, I would bring it up before this society again. I would say now that we have obtained an operating-room at Dr. Rich's office in the Arcade, where any gentleman can call and examine this apparatus and test it, and later on I may ask an expression of opinion in regard to it.

Dr. Bogue.—I have had sent to me this morning a remarkable bit of prosthesis. I am called back to New York, and if it be the pleasure of this society to have me show it now, I will be glad to do so.

One of our members, Dr. Michaels, of Paris, several years ago made an apparatus to replace an amputated portion of the lower jaw. It was worn under the periosteum for about a year, and the patient then died, but the result was so remarkable that when next a patient presented himself to Dr. Payon, a prominent surgeon of Paris, requiring the amputation of portion of the bone, Payon went to Michaels to see what could be done. Payon put that attachment which I show you here into the man's shoulder. It has a rotary motion. After two years of wearing, Dr. George Allan and myself went to see this man. That was the model which was shown to Payon. From that another was made exactly like it, except that the wires were made of platinum instead of German silver.

The President.—Is the clinical history of this case published?

Dr. Bogue.—Yes; it has been published in Paris, and here is an account of it. A large photograph was made of the man, who is now alive and well.

Adjournment until 7.30 o'clock this evening.

(To be continued.)

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

A REGULAR meeting of the Odontological Society of Pennsylvania was held September 12, 1896, at 1415 Walnut Street, Philadelphia, President Peirce in the chair.

REPORT OF THE DELEGATE TO THE AMERICAN DENTAL ASSOCIATION.

Dr. Head.—The American Dental Association was held this year at Saratoga. There were a few good papers, but the chief interest was a step made in the direction of consolidation between

the American Dental and Southern Dental Associations. The place of meeting next year will be Old Point Comfort, where the two societies are to hold a joint meeting, and afterwards confer upon the advisability of uniting in one society embracing all the dentists of the United States. As a fitting climax to this decision, a man whom we all respect and honor, Dr. James Truman, was elected president of the Association for the year 1896–1897; and this election was especially fitting, inasmuch as the doctor has advocated such a consolidation for some years past. While his election is a great honor to Philadelphia, every dentist in the country cannot but feel that the American Dental Association did honor to itself in choosing one so eminently fitted to fill the office.

Before reading my paper for this evening, I would like to show you a small pad that has been of great use to me for the last two years.

At one time I used rolls of bibulous paper, then absorbent cotton, and finally they have been combined. The cotton, being enveloped in the paper, is highly absorptive, while the size of the pad can be enlarged or decreased at will. When placed over the mouths of the glands it serves all the purposes of the napkin, without being so bulky.

Dr. Gaskill.—Is it any more efficient than cottonoid?

Dr. Faught.—The great objection I have found to cottonoid has been the shortness of its fibre. It is exceedingly unstable, and the peculiar linty dust annoys the patient's throat, especially if they are at all sensitive. I gave up the use of the cottonoid and have adopted a method similar to Dr. Head's.

Dr. Gaskill.—My patients have never been troubled by dust or lint when I have used it.

Dr. Broomell.—My experience has been somewhat similar to that of Dr. Faught. Further than its disturbing effect on the patient's throat, the cottonoid has a tendency to mix in with the filling, especially gold. I found it also objectionable on account of its clinging to the instrument.

Dr. Head then read his paper on "The Application of Crown-Work to the Manufacture of Metal Plates."

(For Dr. Head's paper, see page 637.)

DISCUSSION.

Dr. Head.—I am sorry Dr. Bonwill is not here to-night, for the specimens show that I have used his method of putting on spuds, which, extending over the teeth, prevent mastication from injuring

the gum and cutting the enamel, the plate being held absolutely in position.

Dr. Truman.—Is the thin backing gold plate?

Dr. Head.—Twenty-two carat gold, because it is a little less likely to burn.

President Peirce.—I do not understand why Dr. Head speaks of these as Dr. Bonwill's spuds. They were used by Dr. J. D. White before Dr. Bonwill came into practice. They were on the first case that I ever saw when I was a student.[1]

Dr. Head.—The first plate that I ever saw that had them was made by Dr. Bonwill, and they seemed so valuable that I never omitted an opportunity to use them where possible.

President Peirce.—When I was a student a case came into my hands with three clasps on it, and each clasp had a spud.

Dr. Head.—They make all the difference between cutting and non-cutting of the teeth.

Dr. Warren.—I want to indorse the method of Dr. Head's. I have used it for possibly two years. My brother and I performed the same operation in our laboratory, with the exception that we used pure gold thirty-four thickness, and one plate. It should be brought over the edges. That is the weak point. Bunch it down with a sharp chisel and make a slight spur. That spur will hold the backing in place, which seems preferable to bending the pins.

Dr. Head.—It is a question of having a thick backing. Thirty-four is hardly sufficient. I prefer to have a reinforced backing on my work, at least at the bottom, as it can then be ground to any shape desired.

Dr. Broomell.—Dr. Head advocates bending the pins. I think

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[1] Dr. Peirce in his remarks on Dr. Head's paper informed the Society that I was not the first to place *spuds* upon metal plates. I never said I was. Dr. J. D. White, I know, did it long before. What I do claim is, there is no evidence that any one ever made clasped plates on the plan I devised and gave to the dental world and published in the proceedings of this Society in this journal six or more years ago, and I made the spud of absolute importance in every case of these removable sectional bridges. But the spud is of no use unless one knows how to solder a clasp to the plate and all the conditions required in my description of such work. I claimed then that, while I used an old thrown-away spud, the combination was entirely new, and the laws of invention recognize my right, although it was never patented.

W. G. A. Bonwill.

Philadelphia, September 21, 1896.

he said you may even rivet them. In my mind, bending is dangerous, particularly if a pair of pliers be taken and a pressure exerted that is continually pulling from the porcelain. When you apply the heat the platinum pin will make that pressure stronger, and checking of the tooth is apt to occur. Dr. Warren's plan, I think, is an excellent one. The backing should be held lightly against the tooth, and no strain should be exerted on the porcelain.

Dr. Head.—The question of bending the pins is not one that I insist upon. As regards the advisability of riveting pins, it hardly, in my opinion, needs any defence. Dr. Warren's process is excellent where the backing fits the tooth, but it does not seem to be a method applicable where there is difficulty in making the backing hug. The advantage in riveting the pins lies in the fact that the backing can be made slightly concave and then brought down accurately against the tooth, which is riveted on soft lead. Dr. Broomell says bending the pins down on the backing is dangerous, as the expansion of the platinum in heating would be likely to cause checking. With this view I cannot agree. As the expansion of the pin would be much greater along its length than in its diameter, the tendency in heating would be to push it away from the porcelain, and the danger from subsequent contraction would be no greater than in any other method of treating the pins. The only risk in bending the pins lies in the possibility of fracturing the porcelain, and if there is sufficient tooth body there is no reason, in my opinion, why this method should not be employed.

Dr. Truman.—For twenty years I riveted the teeth before soldering, and I never had any trouble. It is simply a matter of use, not to rivet too tightly, and I abandoned it because I thought the solder sometimes failed to penetrate behind the pin. Then I began splitting the pin. I do not know that it is any better. It seemed to be accompanied with less difficulty. I do not quite understand Dr. Head's process of working the thin plate first to make it completely fit down on a tooth that is ground to the plate. I always had difficulty in running solder into a place of that kind, and in placing pieces of metal to fill a space was never satisfactory. The double plate is a very old affair. I remember it as far back as 1853, when Dr. Reynolds introduced the double plate in Philadelphia (the most beautiful work ever seen in this country up to that period), and the large proportion of sets I made, when these were confined to gold or silver, were made in that way, but every tooth had to be separately prepared, soldered, finished up, and placed

back again. A great deal of work, but a beautiful and strong case. I have work in mouths now that were fitted in that way.

Dr. Head.—I use the double backing, but do all the soldering at one heating.

Dr. Gaskill.—My method in backing the tooth follows Dr. Warren's plan, but I make three spurs. Since using that process I have had much less trouble with the teeth cracking during the soldering process.

Dr. Boice.—I think that Dr. Truman struck the nail on the head when he said that riveting prevented the solder from flowing around the pin. The object of the spur is merely to hold the backing in place. When I was working in the laboratory I was instructed to rivet them, but it did not satisfy me. While experimenting one day, I made spurs, and I have been using them ever since. It is easier to put the spurs on the side. I hardly think the riveting will break the tooth. It is the injudicious heating that causes this effect. Dr. Head said that one disadvantage of attaching teeth to gold plates with rubber lay in the fact that space was formed by shrinkage of the rubber. If one properly adapts a piece of rubber with sufficient pressure to a clean tube or plate, and vulcanizes it, I defy any gentleman to pull off that rubber, and if there is a leakage it is the fault of the materials or operator. If sufficient pressure is used in hardening, the rubber runs away from everything. Its tendency is to assume a globular form. There are so many people finding fault with rubber that I should like to bear my testimony that it is a most valuable material in skilful hands, and too often the accusations brought against it should be laid at the door of unskilful mechanics.

Dr. Head.—I would speak still on the subject of riveting teeth, although I seldom use the process. I still bend them at times, although I prefer the splitting. I am at a loss to see how the riveting of the pin can in any way prevent the solder from flowing around it. The solder will enter into the substance of the plate. If the pin and plate have been well polished, and the whole boraxed and the heat properly applied, I cannot understand why the solder should not flow. I have had no difficulty in this direction.

President Peirce.—The question of the solder not flowing under the rivets is usually due to the whole body not being sufficiently heated. When I worked in the laboratory I sometimes burned the teeth. Frequently, when soldering, I placed my whole case in my muffle. The investment and teeth were brought up to such a de-

gree of heat that the solder would freely flow over the rivets and the union was perfect.

Dr. Truman.—While I was absent this summer I met a jeweller in Massachusetts, a wholesale manufacturer. I inquired of him how they managed the soldering with large numbers of workmen, and economically as far as power was concerned, and how they controlled the air-blast. He said the old method of mouth blow-pipe had practically gone out of use, they preferring the power blower. This costs from eighteen to twenty dollars, the air being forced into an ordinary tin pipe around the tables, and from this attachments were made to the blow-pipe, adapted for both gas and air. He said, as soon as the pipe was full of air the excess would be forced back into the blower, so that there was never any danger of the tin pipe bursting. I have been looking for years for some method by which students could use conveniently compressed air. I had thought of large tanks of some kind. But this is a simple process and can be used in colleges very economically, not requiring great power.

Dr. Warren.—While I was attending the British Dental Society, this summer, Dr. Tomes told me of the case of a man who had been experimenting with the Röntgen discovery, the so-called X-rays, on the right cheek of his assistant. There were five or six sittings of five minutes each. To his astonishment he found that the patient lost his beard entirely on the side of the face touched by the rays, and that the life of the hair was destroyed. As it is an entirely painless operation, it may take the place of the electric needle now used for that purpose, which is not an altogether satisfactory instrument.

Dr. Boice then introduced the following resolutions concerning an election irregularity that occurred at the July meeting of the Pennsylvania State Dental Association:

WHEREAS, At the last meeting of the Pennsylvania State Dental Society, held at Bellefonte, Pa., on the 7th, 8th, and 9th of July, 1896, a crime was committed which, if allowed to pass unnoticed, would place a lasting blot upon the name of the profession in Pennsylvania; and

WHEREAS, All members of the Pennsylvania State Dental Society must feel the disgrace and hold in utter horror those who caused it; therefore be it

Resolved, That we, as members of the Odontological Society of Pennsylvania, hold it as our opinion that those who are responsible for this disgrace to us, as dentists and citizens of the commonwealth of Pennsylvania, should be punished.

These were seconded by Dr. Head, and elicited the following discussion:

President Peirce.—You have the resolution as read by Dr. Boice. What is your pleasure?

Dr. Gaskill.—Mr. President, I was not present at this meeting, but this seems a great step for this association to take without much consideration. I do not know that it would be advisable for this Society to go on record as interfering with the State society.

Dr. Boice.—Mr. President, I introduced the resolution. It is in the province of any one, it is the duty of any man in the State, to argue and to express his opinion. Nobody denies that it is a crime, and it is our place to put ourselves on record as being absolutely opposed to such proceedings. Is there any man who for a moment believes that a crime was not committed?

Dr. Truman.—I was not present, but I have heard much in regard to it. It seems to me that a resolution of that sort should be worded with some caution. The crime should be specifically stated.

Dr. Head.—It is undenied and well known that there was a discrepancy in the report handed in to the Association, and all dentists who hold the honor of dentistry, as well as all who hold the honor of their country dear, inasmuch as the State laws were broken, should consider it a personal matter that whosoever was guilty should be at least condemned by the united voice of their fellow-members.

Dr. Truman.—I do not want it to be understood that I desire to condone this matter. I think it was one of the worst complications that ever happened in this or in any other State. In my view, this association has the proper right to criticise it severely. The point is, what is the best course to pursue?

Dr. Gaskill.—That was the reason for the remarks I made. I agree with Dr. Boice and Dr. Head. We cannot afford to have an act like that pass unnoticed.

Dr. Head.—In regard to the criticism made on the use of the term "crime," my reply would be that there is, in my judgment, no other word for it. It would seem useless to use a milder word. It is hardly our province here to-night to take notice of who did it. It is simply our duty to state plainly and positively that we are in no way a party to it. And, inasmuch as the members of the State Association did not openly speak their minds as an organization against it, they have left themselves, in my opinion, open to suspicion. I am very much opposed to allowing this Society to remain silent on this vital issue.

President Peirce.—I think no one who is familiar with the trans-

action of the meeting can for one moment have any apology for it, but there are several facts that must be recognized. In the first place, more than half the members had left the hall and gone home before the fact was recognized. It was the last act of the society. The subject was before the council and the council had not yet made their report to the society. Now it is a question that must come up before the State society next year, and, while there is no impropriety in this Society's expressing its abhorrence of the transaction, beyond that, it seems to me, we cannot go, because we are forestalling the duty that belongs to the State Association.

At Dr. Warren's suggestion the words "in our opinion" and "if allowed to pass unnoticed" were inserted, and the resolutions as amended were unanimously carried.

Adjourned.

JOSEPH HEAD,
Editor Odontological Society of Pennsylvania.

Editorial.

IS REORGANIZATION NECESSARY?

THE organization of a large body of workers in any field of labor must necessarily be a matter of slow growth. The crudities of the beginning eventually give place to more perfected plans, the result of experience based on an intelligent appreciation of the increased requirements and enlarged spheres of activity. It is safe to assume that nothing originated from the human brain perfect, or is it to be presumed that such a condition is ever reached through our finite efforts. While this is true, it does not follow that intelligent men and women must sit with folded hands and wait for the period of ultimate perfection, if that be possible of attainment. It is immaterial to the thoughtful, progressive mind whether this can ever be accomplished; but every step gained brings humanity to a higher level, and it is to secure this elevation that combination of effort is essential. It is a lamentable fact that the largest portion of the world of sentient human life is indifferent to progress. To these it is sufficient that one day follows another, and year after year remains practically the same.

The activities of any given calling must, therefore, be confined to the few, and discouragement continually awaits these in all their efforts.

The organization of dentistry into society work had its crude beginnings and its martyr period. Those familiar with its history will recall the earnest efforts of Horace H. Hayden to bring the isolated practitioners into one compact body. His repeated efforts and equally repeated failures to accomplish this is pathetic reading in the light of recent history. Those of us who had no part in this cannot appreciate the struggle, and when finally the American Society of Dental Surgeons was organized in New York City, in 1840, with Horace H. Hayden as its first president, it contained so much within it of a disintegrating character that it is not surprising that its life was limited to sixteen years.

One year before its dissolution, in 1855, the American Dental Convention was organized, the second claiming a national character. This organization, in adopting a greater freedom in membership, laid the seeds of its own destruction, and its career closed after a long period of inactivity.

The dissatisfaction occasioned by the methods of the American Dental Convention led in 1859 to the organization of the American Dental Association, which has had now for thirty-seven years uninterrupted prosperity, and has commanded the respect of the dental profession throughout the United States.

Thus, within a period of but little over fifty years, dentists have seen the establishment of three national organizations. In addition to these, we have had the various State societies, the Southern Dental Association, the Section of Dental and Oral Surgery of the American Medical Association, and, more recently, an effort has been made with success to combine several States into a convention, as in the Interstate Meeting held at Excelsior Springs, Mo.

While all this evidences activity, it has a weakening tendency. There is a limit to mental as well as to physical power, and the more this is extended the thinner will become the mental pabulum. Dentistry has not a large field in which to work, and if this be tilled over and over again, the soil will eventually fail to yield anything. It seems, therefore, that the time has arrived in which we must seriously consider whether the energy displayed is not positively injurious to the entire body, and, if so, whether it would not be better to recognize the fact, and at once attempt a consolidation of various interests.

It is, perhaps, hopeless to expect more than a very small

minority of the twenty thousand dentists of the United States to take an active part in any organization. The reasons for this are well understood, and while this apathy is lamentable, it must not be permitted to affect associative effort on the profession as a whole.

The time is ripe for a change. This has been made very clear the past year, but exactly what that change is to be is not by any means so evident. The close of the century finds us in the thrall of indifference. Men seem to be losing interest and faith in all forms of effort, and seem ready to let the professional ship drift into the trough of the sea, with no directing head. *This must not be.* The hour of greatest discouragement is the hour for work, and, in the end, port will be reached in safety.

It must be evident to every thinking mind that a profession governed without system will fail to do any good work, and must eventually lapse into a disorganized mass. To prevent this a national organization is a necessity. If we add to this subordinate branches for different sections of the United States, and these finally ending in local societies, the dental profession will be sufficiently organized for an indefinite period.

In a recent article from the pen of Dr. A. H. Thompson, of Topeka, Kan., this subject was clearly stated, and, while we cannot entirely indorse his plan, the spirit of his suggestions meets our warmest commendation. His plan, in brief, is "to have district organizations, which shall be federated under one central organization, but which shall each meet within the limits of their respective districts at times so arranged that they shall not conflict with each other. . . .

"The whole United States can best be divided into four districts,—the Eastern, Southern, Central, and Western. . . . It is noticeable that in three of these districts organizations already exist. . . . In the Atlantic region we have the present American Dental Association, in the Gulf region we have the Southern Association, and in the Pacific region we have the Pacific Coast Association. . . . It would only remain for the profession of the Mississippi basin region to organize a branch to make the system complete."

It is apprehended that while this seems complete on paper, it will be found very difficult to carry out. The power to organize these bodies does not at present belong to any existing society, and there does not seem sufficient enthusiasm in the dental profession to bring such a system into active working order. If it could be arranged as outlined, it would solve the problem of organization,

but, it is feared, would increase the weakness to which allusion has been made by multiplying societies. This might, in degree, be obviated by limiting the meeting of branches to once in three years.

The idea entertained by Dr. Thompson of relegating the American Dental Association to an inferior place cannot be entertained. It has occupied the position of a national organization too long and too successfully to expect that the members will be willing to sink its work to that of a subordinate body. It is truly a national society, for its membership at last report represented twenty-nine States, including the District of Columbia and two foreign countries. If any change should ever be contemplated, this organization should hold the pre-eminent position it has justly earned.

The next meeting of this body will take place at Old Point Comfort, Va., and it decided to meet there ostensibly for the purpose of effecting some amicable change in the organization of the two societies,—the Southern and the American. There is probably no dissenting voice as to the necessity for some rearrangement, but the difficulty of effecting this without disturbing deeply rooted attachments seems almost insurmountable. If Dr. Thompson's plan, or something similar, be accepted, the path towards union would seem to be a comparatively easy one. The Southern could then maintain its organization, hallowed by many sacred memories, and continue as the representative body of the Southern States. Those of the members who desire so to do could join the central body, and together work for a systematic organization of the dental profession in its subordinate relations.

The year is before us. It should be a year of thought. Let the matter find its way into our local societies, and be there discussed. Awaken the members from the sleep of years to their just responsibilities as individuals. Instil into their minds the one important idea that every man and woman belonging to the profession has a duty to perform, and that this lies in the direction of repaying, in part, that which he or she has received through the work of others, and by this effort help to make our organization worthy of the progressive age in which we live.

Domestic Correspondence.

THE HISTORY OF CATAPHORESIS CORRECTED.

To the Editor:

Sir,—In view of the many discoverers of cataphoresis, or, more properly speaking, electrolytic obtunding of sensitive dentine, I wish to call the attention of the dental profession to the following extract from a paper that I read before the Minnesota State Dental Society at their annual meeting in 1888; also read at the Southern Minnesota District Society at their semi-annual meeting in the fall of 1888; also was read at the Twenty-fifth Annual Meeting of the Chicago Dental Club, held in the Grand Pacific, on February 5, 6, and 7, 1889, by the secretary of that club, in view of my enforced absence. The transactions of that meeting in which the article appears were published in the February number of the *Dental Review;* subsequently they were published in book form, and each member and visiting member was furnished with a copy. The article appears on page 113 of these transactions.

Professor Weeks of the Dental Department of the University of Minnesota read a very interesting article on this subject at this same meeting, as we were working on these same lines, his attention having been called to the subject by the papers I read at this meeting in the summer of 1888. The subject was discussed at some length by Drs. Custer, Atkinson, Thompson, Harlin, Baldwin, and Taft.

The difference in my present method is to make the current constant from nine to fifteen minutes as the needs of the case may suggest. The formula is one that any dentist can compound, and any good galvanic battery of twelve cells will do the work.

EXTRACT.

"This method that we shall present to you at this meeting to gain insensibility in the teeth is the following:

"To a twelve-per-cent. solution of cocaine add an equal amount of absolute alcohol, making a six-per-cent. solution of cocaine in alcohol. In connection with this I use the galvanic current, varying the power as the needs of each case may indicate. The method of application is as follows:

"First apply the rubber dam; wet a pledget of cotton in the solution, placing it in the cavity of the tooth, pressing the point of the positive pole onto the cotton, and the negative pole, with sponge attachment thoroughly wet, to the cheek, turning on the current. Rarely will more than four cells be necessary, if the battery is in good working order.

"An application of three minutes, with an interval of three minutes, and then another three minutes application, are sufficient in the majority of cases, although I have to occasionally make the third application, then dry the cavity thoroughly and commence excavating. My deductions as to the physiological effects are as follows: The galvanic current acts as a vehicle for conducting the medicinal agents; the cocaine anæsthetizes the odontoblastic cells and the pulp; the styptic properties of the alcohol acts upon the dentinal fibrils, they being of an albuminous nature, causing contraction and increased density and firmness.

"My reasons for drawing these conclusions are these:

"I have found that the most sensitive teeth can be obtunded; that after a certain period of rest sensitiveness returns, but never to that degree that existed before the application of the obtundent. Therefore I conclude that a change had taken place in the dentinal fibrils, which I maintain is due to the styptic properties of the alcohol and not to the electrolytic actions of the galvanic current. Another reason is, that a tooth in which the pulp is devitalized is a non-conductor of the electric current. A tooth which has been extracted was subjected to a twelve-cell current of a freshly charged battery and proved an absolute non-conductor.

"In the treatment of peridental inflammation we have to use a stronger current, for this reason. It is well known that a strong current will tetanize the vessels, causing a diminished flow of blood to the parts, thus lessening congestion. The same current longer continued will cause electrolytic decomposition. These are laws of galvanic electricity that are incontrovertible The medicinal agents that I use in all cases of peridental inflammation and the blind abscess are as follows:

"A saturated solution of chloride of sodium, seven ounces; tincture of ergot, one ounce. In the chloride of sodium we have one of the constituents of the blood where it keeps the fibrin and albumen in solution. The tissues in an inflamed condition lack this element, which we supply artificially. In the tincture of ergot we have a drug that stimulates contraction of the blood-vessels, causing anæmia. Taken together we have here a combination

which decreases the flow of blood, reducing congestion, at the same time furnishing an element which is lacking and upon the presence of which normal conditions depend.

"The treatment of blind abscess requires stronger battery power, in order that we may get the full benefit of electrolysis.

"Dr. Weeks informs me that he has had remarkable success in using this method in removing pulps. My experience in this line has been exceedingly limited, having used it in only two cases. The first was partially successful, and the second was a complete success. The failure of the first I attributed to the congested condition of the pulp. I would recommend getting the pulp in a healthy condition first, as I find that in cases where we have an inflamed condition, the full anæsthetic effects are not as easily gained as where the pulp is normal."

Very respectfully,

D. F. McGraw.

San José, California, July 25, 1896.

Bibliography.

Transactions of the American Dental Association at the thirty-fifth annual session, held at Asbury Park, N. J., 1895. S. S. White Dental Manufacturing Company, 1886.

This report, while very much delayed, contains an unusual amount of valuable matter. The illustrations are very superior and are a credit to the publisher. There has been much criticism over the delay of issuing this volume, and, while this is a matter of regret, very few, it is imagined, realize the amount of work connected with the preparation of a volume of 380 pages. It would be poor policy to adopt careless methods, which speed is sure to engender, in place of that careful preparation manifested in this report.

Extraction of the Teeth. By J. F. Colyer, L.R.C.P., M.R.C.S., L.D.S., Dental Surgeon and Lecturer on Dental Surgery to Charing Cross Hospital, etc. London: Claudius Ash & Sons, Limited.

The author of this small book of 102 pages, fully illustrated, says, "I have published the following notes on 'Extraction of the

Teeth' in the hope that they may prove of some small value to the student and practitioner."

To the beginner in practice the book will certainly prove an invaluable companion. It is prepared with care, and the necessary manipulations are clearly described, so that no one should experience difficulty in practically following them, and what is more to the purpose, they are correctly stated.

It will probably never be possible to lay the forceps entirely aside in dental practice, and a dental manual of this kind not only has a special value, but is an absolute necessity.

Chapter III., on the "Extraction of Misplaced Teeth," might well have been omitted, and should not have a place in future editions. The extraction of the central incisor because it may be outside of the arch or the lateral inside is contrary to American thought and practice. The same may be said of the cuspidate.

Chapter V., on "Difficulties, Complications, and Sequelæ of Extraction of the Teeth," must prove of special value to the beginner.

As a whole, the book can be cordially recommended for reference in this special line of work.

Notes and Comments.[1]

We may learn from the Humblest.—Dr. T. B. Welch says that the man who "knows everything" and "can do anything" is usually a blockhead. The man who is willing to sit at the feet of the humblest, and can learn something from the most unassuming, becomes rich in variety of store, and that store of wealth is sure to be so manipulated as to serve him as wisdom on many an exigency. The true scholar treasures up something valuable from every one and from every phase of life.

Pluck, not Luck.—Luck, as Rev. J. G. Rust truly says, is a foolish doctrine of fate; it is the silliness of superstition; it is the

[1] The assistant editor solicits contributions for this department,—new methods, new remedies and formulas, or any short practical note which may prove of value to the practitioner or student. Address 1718 Walnut Street, Philadelphia.

cynicism of fools, incompetents, and failures. You never hear a real sensible man talking about luck; he knows the philosophy of success too well; he knows the meaning of patience and pains-taking care, of energy and economy.

Pyorrhœa Alveolaris.—In listening to Dr. Talbot's paper upon pyorrhœa alveolaris, read before the Academy of Stomatology of Philadelphia, we noted his remark that a general invasion of this disease—that is, attacking all the teeth—"never occurs." This is an error, as such cases frequently occur, and no doubt are observed by many practitioners. The writer has treated more than one case in his own practice where every tooth was affected, and has met several in the college clinics.

Function of the Vacuum-Chamber.—In a contribution to the *Dental Cosmos*, Dr. Henry Burchard claims that the vacuum-chamber has an *enduring function*, and offers as a proof of this the statement that by temporarily filling the depression or chamber with wax, or by perforating the wall of the chamber, the result, in either case, would be the almost total loss of adhesion.

The doctor is correct where he says filling the chamber with wax would interfere with adhesion, but this is owing to the fact that, as a *result of the chamber*, the soft tissue is drawn down and into it; the wax would therefore press upon this hypertrophied portion, preventing the plate from going to place. As perfect adhesion depends upon perfect adaptation, anything that interferes with the latter tends to destroy the former.

The best evidence of the uselessness of vacuum-chambers (excepting for temporary assistance) is the fact that full upper dentures are continually being successfully placed in the mouth without them.

New Formula for Local Anæsthetic.—The formula given below is claimed to be an efficient local anæsthetic, and is original with Dr. W. D. Dalrymple, Ogden, Utah:

℞ Cocaine hydrochlorate, grs. ii;
Carbolic acid, gtts. x;
Glycerin, ʒi;
Listerine, ℥i;
Aqua dest., ad q. s., ℥ii.—M.

Current News.

NORTHEASTERN DENTAL ASSOCIATION.

The annual meeting of the Northeastern Dental Association will be held in Springfield, Mass., October 21, 22, 23, 1896. An interesting meeting is promised, and a large attendance is desired. Please mark off the dates on your appointment books *now* and make an effort to be present. Programmes will be sent in due time.

Edgar O. Kinsman, D.D.S.,
Secretary.

Cambridge, Mass., September 19, 1896.

Selections.

FATAL ACUTE POISONING BY COCAINE.

Dr. O. H. Garland, of Leith, relates the following case, of some medico-legal interest owing to the few fatal cases of the kind recorded: "About 3.30 p.m., on Monday, October 7, 1895, at the request of the authorities, I made a superficial examination of the body of a young woman who had at about seven a.m. swallowed, for the relief of toothache, upward of two fluidrachms (eight cubic centimetres) of a ten per-cent. solution of the hydrochlorate of cocaine,—the equivalent of twelve to fifteen grains (0.78 to 1 gramme) of the alkaloid. She had almost immediately afterwards suffered from vertigo, followed by epileptiform convulsions, nine in number, occurring in somewhat quick succession, and died within forty minutes. She appeared to be about seventeen years of age, and the body was well nourished. The trunk still contained a considerable degree of warmth, but the extremities were cold, *rigor mortis* being well developed in all of them. The face, lips, and anterior surface of the body were very pallid and wax-like, while on the dependent portions well-marked cutaneous hypostasis was present. The expression of countenance was placid. The pupils were dilated, and the conjunctivæ were not

injected. The teeth were firmly clinched. On the following day (Tuesday), as further instructed, I made a post-mortem examination. The external appearances remained as described. Frothy mucus, slightly blood-stained, was freely exuding from the right nostril. The brain was anæmic, but otherwise normal. The meninges were deeply congested. The heart was healthy in substance, and all the valves were found to be competent. The right ventricle contained a small quantity of dark-colored fluid blood; the left ventricle was quite empty. Both ventricular walls were relaxed. The lungs were too much congested throughout, and everywhere highly crepitant. A considerable amount of frothy mucus, in part blood-stained, was present in the bronchi. The liver, spleen, and kidneys were hyperæmic, but otherwise normal. The stomach and contents were removed, and preserved intact for expert analysis; consequently there was no opportunity afforded for inspection of the mucous surface of that organ. The bladder contained from three to four ounces of urine. All the other organs were normal." The case, according to the author, lends support to the view of Mannheim, that fifteen grains (one gramme) of cocaine constituted a fatal dose. In the present state of our knowledge it is, however, practically impossible to state the smallest lethal dose, seeing that a dose of two-thirds grain (0.04 gramme) has caused death, and so minute a dose as 0.01 grain (0.00065 gramme) has given rise to symptoms threatening life.—*Lancet.*

FORMULA FOR LOCAL ANÆSTHESIA.

A MIXTURE of chloroform ten parts, ether fifteen parts, and menthol one part, used as a spray, is recommended as an excellent and prompt means for obtaining local anæsthesia, lasting for about five minutes.—*Boston Medical and Surgical Journal.*

THE MEDICAL PROFESSION IN THE UNITED STATES.

ACCORDING to the Bulletin on "occupations" of the eleventh census just issued, there were in the United States, in the year 1890, 104,803 physicians and surgeons, or about one to every 600 of the population. The total number of wage-earners of all occupations is placed at 22,735,661. There were 89,630 lawyers, 88,295 clergymen, 59,090 nurses and midwives, 17,498 dentists, and 9900 undertakers.—*Medical News.*

THE

International Dental Journal.

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Original Communications.[1]

CERTAIN MANIFESTATIONS OF SYPHILIS OF IMPORTANCE IN THE PRACTICE OF DENTISTRY.[2]

BY CHARLES M. WHITNEY, M.D., BOSTON, MASS.[3]

In accepting the invitation to address this Society upon the subject of syphilis in its relation to the practice of dentistry, I found myself in the position of one who has no new or unfamiliar facts to present, but must content himself with a repetition of those already well known.

The importance of the subject, however, is so great that I was only too glad of an opportunity of refreshing your minds upon it, and of repeating certain facts which have been observed. Some of these I have already presented in a paper before another society of dentists, and from this I shall take the liberty of quoting at this time.

For more than four centuries there has been in existence in the world a destructive and dangerous disease, characterized by appearances more varied, and results more disastrous than almost any other with which we are acquainted.

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[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] Read before the Massachusetts Dental Society, June 4, 1896.

[3] Surgeon to the Genito-Urinary Department of the Boston Dispensary.

Its very name, in its mythical origin, implies the lowest associations,—a companion of swine,—and its mere mention seems to suggest immorality and uncleanness. While in most instances there is a measure of truth in this view, it is not always the correct one, for the disease may, and has been, innocently acquired, and it is to this particular portion of the subject that I wish to especially call your attention.

In order that you may understand by what means this innocent transmission takes place it is necessary to call your attention to certain points in the natural history of the disease as it ordinarily manifests itself, and to consider by what means this danger can be avoided. Syphilis, by one not familiar with its wonderfully varied appearance, is frequently pictured as a disease accompanied by loathsome eruptions, by facial or bodily deformities so distinct that any one could recognize them, and therefore could avoid any danger of contamination for this reason alone; by a condition, in short, like that of leprosy, both repulsive and hideous. If such were the fact, it would add much to the safety of the community but it is not, for, in many instances the disease, from its onset to its conclusion, may be so mild that any one but a trained observer may overlook some of its most apparent symptoms. Syphilis, however, in spite of the variety of symptoms in its later stages, has at its onset tolerably well-defined laws of development.

It is a disease requiring for its origin inoculation of the virus from some pre-existing case upon a denuded surface, either epithelial or mucous. Wherever this inoculation occurs an absorption of the poison results by means of the lymphatic vessels, and the beginning of the first stage of the disease takes place. This primary inoculation does not require a large denuded surface; a minute opening no larger than a pin-point serves quite as well as a larger one, and it may be quite invisible to close inspection, and much more dangerous because so easily overlooked.

Inoculation, then, having occurred, one of two things happens; the point of entrance of the poison may heal, to reappear later, or it may slowly increase in size. In either case we have at the end of a period of about three weeks a local ulcer of varying size and appearance, the initial lesion of syphilis, commonly called the chancre. This apparently local sore exhibits wide variation in appearance, depending partly upon the size of the original abrasion and partly also upon the locality affected. Upon the finger a common situation is at the base of the nail, and there may be a reddened, swollen ulcer, with a slight watery discharge, upon the lip; how-

ever, where the tissues are soft, a thickening or induration occurs about the primary lesion, so that we have a hard, usually painless tumor, varying in size from a pea to a large cherry. When present, this induration, which is due to a development of granulation tissue, is extremely characteristic of syphilis, and upon mucous surfaces is rarely absent. As the lymphatic vessels slowly carry away the poison, it is stored up, we may say, in the glands nearest, and these enlarge. Thus, in the case of infection upon the lip, we look for an enlargement of the submaxillary gland upon the affected side. In infection upon the finger, a small gland above the elbow is enlarged.

Introduction of the specific poison into the system through a denuded surface, a period of delay or incubation, and the appearance of a local sore with enlarged glands in the vicinity mark, then, the first or initial stage of syphilis.

However obscure or slight the initial lesion may be, it is always present, for by this and by no other means—save in infants by heredity—can the disease be acquired. Not rarely the nature of these extragenital lesions is not recognized; the later manifestations are mistaken for other skin-diseases, and, being untreated, in later years we have the long train of suffering and deformity consequent upon untreated syphilis. Counting, then, three weeks for the first period of incubation, we come to a second and longer period of delay before further constitutional symptoms make their appearance. This usually occupies six weeks, during which the morbid process is apparently at a stand-still save for a slight increase in local symptoms and greater adjacent glandular enlargement. At the expiration of this period we have other symptoms, constitutional in character, which usher in the second stage of the disease. The first of these to appear is an eruption upon the skin, consisting of rose-colored spots, scattered thickly over the body, resembling somewhat the eruption of measles. At about the same time the throat becomes sore, and presents a reddened area, usually limited to the fauces, or extending forward to the junction of the hard and soft palate, where it is sharply limited. Later, there appear the mucous patches, which constitute the first and most important symptom of syphilis in its relation to the practice of dentistry, and to which I shall presently call your attention in more detail. With these symptoms we usually find more or less headache, occasionally feverish sensations, and feelings of general discomfort. The glands of the body generally enlarge, the hair upon the scalp and eyebrows may loosen and fall, and the original eruption may become scaly, or otherwise altered in character.

Under appropriate treatment these symptoms disappear, the skin-eruption gradually fades, leaving little or no trace of its presence, and the second stage of the disease is passed.

From this time the disease manifests no regularity of course, and save for an occasional mucous patch in the mouth there may be nothing to mark its presence in the system. Sooner or later, however, in untreated cases, the symptoms of the tertiary stage appear, and here for the first time we find evidence of the destructive and terrible nature of the disease. The limits of this paper will not allow me to more than briefly touch upon these, but it will suffice to say that no organ or structure is safe from its ravages. Its possibilities untreated are appalling.

Upon the skin may appear disfiguring and repulsive eruptions; ulcers of varying size and in varying locations, resulting in deformity and scars; the organs of special sense may be attacked, resulting in loss of sight or hearing; by disease of the throat the voice may be impaired or lost, and a hoarse whisper be all that is left of a clear voice; the bones become inflamed, resulting in necrosis, which may be present in the nasal bones, causing frightful deformity by loss of the whole nose; the brain may be involved, resulting in loss of reason or paralysis; tormenting neuralgias, local and general, mark its effect upon the peripheral nerves. All these and many more make up the list of the dreadful possibilities of the disease when neglected and allowed to pursue its own ways. The most strange and unfortunate thing about this disease is its latency, there being no way of determining when an outbreak may occur, for after many years of fancied security, any of these dreadful calamities may result. Preventable, if their character is discovered in season, they are often beyond the help of the physician in saving the disastrous effect of their presence in important organs or structures.

Admitting, then, that these are the possibilities of syphilis, what especial interest have they for the dentist, whose professional attention is directed to the mouth, and not to the eyes or throat, to the skin or bones, to the brain or other visceral organs?

A most important relation indeed, for it is the mouth lesions of syphilis which are the most potent agents in its innocent transmission,—by far the most important because the least understood, and therefore not guarded against. Until within a few years this subject has received but little attention. Occasional cases have been reported of mouth infection, and every physician has been aware of these dangers; but the patient, but little instructed regarding its precise

nature, has inoculated innocent persons, and these again others, and thus the vicious circle has widened.

What form, then, does syphilis take in the mouth that we should fear it so greatly, and that contamination should so frequently result?

At the time of the secondary symptoms there appear various changes in the mouth and throat, to only one of which I wish especially to call your attention,—the mucous patch, as it is termed. Analogous to the rose-spots upon the skin, modified only by the different structure of the lining of the mouth, there appear white spots of various sizes, situated upon the inner surface of the lips, especially where they are brought in contact with an irritating point like a decayed tooth, along the sides of the tongue, upon the tonsils and roof of the mouth. Making their first appearance then, they are the most frequent of any of the symptoms of the disease, and constantly reappear during its course whether treated or not. Their size is variable, and they are only moderately sensitive. They are covered with a whitish, opaline film, which gives them the appearance of having been touched with caustic.

They are not unlike the frequent and harmless "canker spots," and very often cannot be distinguished from them. The chief points of difference are that the canker spots are more of an inflammatory type, yellowish spots with a reddish circumference, and they are much more sensitive.

Besides these most common and dangerous manifestations of syphilis in the mouth, we have other and later symptoms. Deep ulcerations may occur upon the mucous membranes, with destruction of tissue and deep scars. Gummata, which occur as a late symptom in various parts of the body, occur in the mouth and throat, and consist in one or two small, hard tumors, which very rapidly degenerate, leaving an open ulcer, and when they occur upon the palate or roof of the mouth very frequently perforate the tissues separating the mouth and nose, and a very troublesome condition results, requiring the aid of the dentist in many instances. The early symptoms already described are the most dangerous to the dentist, for it must not be forgotten that not alone are the spots themselves contagious, but the saliva also, and may convey the poison to any part which it touches. How important, then, for the dentist to use proper care in these mouths, with his fingers constantly bathed in a solution of syphilis, if I may be allowed the phrase!

How shall the dentist, if a patient presents himself with

spots in the mouth, distinguish the harmless from the dangerous form?

Bearing in mind the other symptoms most common, it is well to look for any swelling of the glands behind the ears, for loss of hair or eyebrows, for crusts upon the scalp, and scars of other ulcerations in the mouth, especially at the corners. These may be all absent, and I do not hesitate to say that, whenever any whitish spots are seen in the mouth of a patient, they should be viewed with suspicion, and proper measures for protection taken in every case, whether further evidences of syphilis be present or not. Furthermore, it seems to me to be the obvious duty of every physician having a case of syphilis under his care to advise the patient to refrain from having any dental work done until the contagious stage is passed, or, at any rate, until all local signs have disappeared from the mouth. Remembering, then, that syphilis in a most contagious form may exist in the mouth, and show nowhere else evidence of its presence, we can readily understand that the disease may be innocently acquired or transmitted in two ways,—either by direct contact or by the deposition of the saliva or virus from any lesion upon any object which may be brought in contact with a denuded surface.

For a proper understanding of the subject the medical profession is greatly indebted to Dr. L. Duncan Bulkley, of New York, whose labors have been incessant in collecting all available evidence upon the subject, and the result of which he has compiled in a recent work, entitled "Syphilis Insontium, or Syphilis in the Innocent," and it is from this classic that I have obtained many of the facts which I shall present for your consideration. Instances of direct transmission are of frequent occurrence; kissing has been the cause of many chancres of the lips, and no one who has seen many cases of this disease has failed to observe illustrations of this form of infection. Tooth-wounds, contracted in various ways, as by blows or by biting, have been followed by local and general syphilis. I have personally observed two instances of this method. Sucking wounds and removing foreign bodies from the eyes with the tongue have produced the same untoward result.

In considering the possibility of infection by indirect means we cannot but be amazed at the variety of ways in which this is brought about. Any article upon which can be deposited the diseased virus can produce this effect, and we find instances in almost all occupations. The glass-blower, passing the tube from mouth to mouth; the musician, using the flute or cornet; the shoemaker, whose

mouth is filled with pegs, to be thrown down and used by an uninfected individual; the artisan, with the blow-pipe, have all been the means of infecting their especial implements, through which others have become infected. The pencil, wet in the mouth of one infected, spreads the disease to the innocent.

There is, apparently, no limit to possibilities of these methods. Tooth-brushes, toothpicks, clothing, towels, pipes, razors, whistles, spoons, pins, coins, drinking vessels, in short, any of the articles used in industrial or domestic life have become infected, and have contributed to the number of cases of extragenital syphilis. In Finland two hundred cases were infected by the operation of wet-cupping, and hundreds of other cases have been ascribed to the same cause in other countries. Over seventy were infected in Paris by the Eustachian catheter of an otologist. A short time since a patient was referred to me, who had a typical chancre of the left nostril and well-marked eruption over the body; its origin was in doubt, but may have been due to the use of a spray-tube or contaminated towel. In estimating the importance of mouth lesions in the production of innocent syphilis, it is only necessary for me to call your attention to the statistics of Dr. Bulkley. He has collected nine thousand and fifty-eight cases of extragenital infection, and of these there were fifteen hundred and four in the mouth and throat, and of the remainder three thousand two hundred and forty-nine suggest from their location the possibility of this source of infection, making a total of four thousand seven hundred and fifty-three cases, or more than half of all the cases of this kind. When we consider that not one in fifty which occurs is reported in medical literature, we can form some idea of the probable number of cases. When it is remembered also that the innocent acquirement of syphilis is the exception and not the rule, we can form some estimate of the thousands of cases which have been in the past and are in the present.

From its nature, kept as secret as possible, it is impossible to estimate the prevalence of syphilis in the community, and it is to hospitals that we must look for some degree of definiteness upon the point. Even here, however, we have only the evidence of the special departments, and of such other cases as bear evidence of the disease when treated for other complaints, which are often not placed on record.

Dr. Armstrong, in Morrow's "System of Genito-Urinary Surgery, Syphilology, etc.," has investigated the subject, and his results are interesting.

In a New York hospital, St. Luke's, which serves as a type of hospitals everywhere, about one per cent. of cases treated were syphilitic, and of those refused admission about six per cent. were similarly affected. In the United States Marine Hospital service, where thirty to fifty thousand cases are annually treated, about ten per cent. were syphilitic. In the United States army, one and a half per cent., in the navy about two per cent. Accepting one to two per cent. as the mean, and applying it to a city of the size of Boston, where in the vicinity of one hundred thousand patients are annually treated in the various hospitals, we find from one to two thousand cases of syphilis prevalent in the community, and I do not think it any exaggeration to say that not one or two, but many thousand cases are present in this and every other large city.

Realizing that each case may inoculate many others, innocently or otherwise, we cannot ignore the danger because we do not see it or neglect precautions which may seem unnecessary.

Among the many instances of acquiring or transmitting innocent syphilis, how many have we which directly concern the profession which I have the pleasure of addressing to-day? How many dentists have been inoculated in operating upon syphilitic patients? Availing myself of Dr. Bulkley's work, I find there are not many instances on record, but even a single case is an extremely instructive object lesson. In the *Boston Medical and Surgical Journal* of some years ago, a dentist reports his own case. Infection occurred on the left hand, above the nail, in the middle finger.

Neumann reports a case from a wound on the finger, produced by the sharp edge of a tooth. Otis and Hutchinson report each a case, and Bumstead states that he knows of several cases.

It is not necessary to multiply cases to prove a proposition so simple, and the very nature of the disease renders the subject of it very loath to add to our knowledge by reporting his case.

Of instances of conveying the disease upon dental instruments we have some ten or twelve cases, nearly all being produced by extraction of teeth.

Admitting, then, these dangers, how shall they be avoided? By what means shall the dentist avoid inoculation himself, or prevent a possible infection of his patients? As regards the first, careful inspection of the fingers, especially about the roots of the nail, the site of the common "hang-nail," as it is termed. Every abrasion should be thoroughly brushed with contractile collodion. Should any escape observation in working upon such a case, the spot

should be thoroughly washed with soap and water and touched with one-per-cent. solution of corrosive sublimate or pure carbolic acid.

As regards the second possibility, all instruments should be frequently and thoroughly cleansed, and after working upon such a case, should be sterilized by boiling water, to which has been added one-per-cent. washing soda (a tablespoonful to a pint) to prevent rusting of the instruments. If I were to select any special instrument deserving care, I should select the mouth-mirror, which cannot be sterilized or rendered antiseptic by chemical means. In such cases an individual mirror should always be used, as has already been suggested by Dr. Henry L. Upham, a member of this Society.

The mouth-piece used in administering gas should be very carefully watched and kept absolutely clean. Instruments may be rendered fairly safe by immersion in two-per-cent. creolin solution, or pure carbolic acid. By such precaution much of the danger to the dentist can be averted, and so unfortunate a circumstance as infecting a patient can be avoided.

Having thus briefly sketched some of the chief points in relation to syphilis, I desire to emphasize these points: that we have in the disease one that is more prevalent in the community among all classes than is generally admitted; that the symptoms in the mouth are the earliest and most constant, and exist where there are no other; that these lesions have been the means of inoculating many innocent individuals in a variety of ways, and, finally, that dentists have not only been themselves inoculated, but have infected patients by means of their instruments. Knowing these facts, can we doubt the wisdom of instructing dental students in relation to the subject in order that so deplorable an accident as syphilitic infection should be guarded against. It is not my purpose to exaggerate the frequency of this disease or the dangers arising from it in the practice of dentistry, but to present the foregoing facts and invite you to make your own conclusions from them.

Sooner or later public attention must be called to the fact that the acquirement of syphilis is not necessarily a disgrace, and that morality is not a certain means of avoiding it. When every public drinking glass is a menace, when innocent children may be inoculated by toys passed from mouth to mouth by one in whom the disease is present, by parental guilt or ignorance; when so simple a thing as wetting the pencil in the mouth has resulted in the development of the disease, surely it is time to look the matter squarely in the face

and to describe in plain language its nature and its dangers. Until this is done, innocent victims must be sacrificed upon the altar of ignorance.

The guilty must suffer the consequences of their own acts, but speed the time when they and every one in the community shall have full knowledge of this disease, as of other contagious diseases, and thus be saved from its direful results.

If I can hope that I have presented any facts in this paper which are worthy of your serious thought I shall be well satisfied at having accepted your courteous invitation to address you upon this subject.

ELECTRICITY AND ITS APPLICATIONS IN DENTISTRY.[1]

BY WILLIAM E. CLARK, S.B., AND PHILIP W. DAVIS, A.B., S.B.

After considering what ought to be the best way to treat of the nature of electricity and of its applications in dentistry, Mr. Clark and I decided that our aim should be to give to those of you who do not thoroughly understand the nature of electricity, but who intend making use of such of its applications as are at your disposal, the power to make an intelligent investigation for yourselves, and to enable you to come to a decision concerning what electrical apparatus will best serve your individual purposes and how to select it. At the same time we shall not be sorry if we succeed in arousing an interest in the use of this agent among those who think that electricity is still in its infancy. In dealing with this subject it is important not to neglect the theoretical side for the practical, since a correct conception of the former is essential to a thorough understanding of the latter. Nor do we think it well to omit a brief mention of the historical side of the subject, if only for completeness' sake. In trying to make ourselves clear to those who have not made a special study of this question, we may at times seem elementary to such among you as have, and we must beg your indulgence.

Some two thousand years ago the Greeks were in the habit of buying bits of amber which the Phœnician traders brought from the shores of the Baltic. They wore them as amulets, because they

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[1] Read by Mr. Philip W. Davis, of Cambridge, Mass., before the American Academy of Dental Science, at Young's Hotel, April 1, 1896.

had noticed that when rubbed against cloth a piece of amber would attract small pieces of straw and other objects, and they regarded this phenomenon as an evidence of a mysterious sort of life which they called the "soul of amber." Now in the course of ages this little bit of knowledge was handed down, and it was also gradually discovered that other substances possessed the same power. At last this property of attraction became known as ἤλεκτρον, which is the Greek word for amber, and from this is derived our word electricity.

The phenomena of frictional electricity were studied scientifically as far back as the sixteenth century by one Dr. Gilbert, body physician to Queen Elizabeth; but little was accomplished until the discovery of the Leyden jar by Dean von Kleist in 1748, who found that electricity could be imprisoned or accumulated in a glass jar coated inside and out with a conducting material.

That brilliant quack Mesmer, who turned Paris topsy-turvy, was probably the first man to use electricity on the human body. But the inventors who laid the foundations of modern electrical science were Galvani and Volta, who invented the electric battery in the middle of the eighteenth century; Ohm and Ampère, physicists who discovered the laws of flow of current; Oersted and Faraday, who discovered the laws of induction. Since then there have been many investigators of wonderful ability, but it is the names that we have mentioned that you will meet with in the course of your inquiries in the electrical field.

The problems concerning the nature of electricity and the laws governing its actions are as well known to physicists as the laws governing most other phenomena of nature. This may seem a little remarkable at first thought, but it will not seem so strange when it is remembered that there have been many great workers in this field, and also that many of the wonderful strides which have been made in the other sciences are of quite recent date.

Electricity is a form of energy, is subject to the laws governing all other forms of energy, and can be readily converted into any one of them. There are two characteristics which determine completely the amount of energy present in any circuit. These are intensity and quantity, and they have been named after two celebrated physicists, the unit of quantity being called the ampère, and the unit of intensity the volt. It is this method of naming electrical characteristics, born of a desire to honor the great ones of the science, which has loaded it with many peculiar words so confusing and mysterious to the uninitiated.

In order that a flow of electricity should occur between two bodies one of them must be at a higher potential than the other. To explain this let us make use of an example. Imagine two long pipes closed at one end, while at the other is some mechanical device which shall force air into one, raising the pressure a given amount, while sucking it out of the other, reducing the pressure an equal amount. Then if anywhere along the line a small tube is inserted connecting the two mains, a flow of air will immediately occur from one to the other, depending in its quantity on the friction due to the small tube. This, gentlemen, is analogous to a complete electrical circuit. For pipes substitute wires and for the pump substitute a dynamo. The friction of air in the tube has its electrical counterpart in a property which a wire possesses of offering more or less resistance to the passage of a current, according to the cross section of the wire and the material of which it is composed. The unit of resistance has been called an ohm.

There is a simple law which governs the relations of these three quantities to each other, and it is this: that the pressure in volts, divided by the resistance to flow in ohms, is equal to the quantity in ampères. It has been stated that the pressure and quantity determine the amount of energy in a circuit. The pressure in volts, multiplied by the quantity in ampères, gives the energy in watts, a term derived from the name of an inventor who did more than any other to further the possibility of transforming one form of energy into another. I mean the inventor of the steam engine.

And now a word about the dynamo and its construction. It depends for its principle on the fact discovered by Faraday, that every wire carrying an electric current is surrounded by a magnetic whirl, and that whenever one of these whirls cuts across another wire a current is at once induced in it. When a long wire is coiled together into a spiral the magnetism is concentrated through the coil. Soft iron has the property that when introduced into this spiral it increases the magnetism present enormously. The iron is extended beyond the coil at both ends and is bent into a U-shaped form, the ends being concaved so that a cylindrical body may revolve between them. In the space between these poles, as they are called, coils of wire are revolved. As they cut the magnetic field extending from pole to pole an electric pressure, tending to produce an electric current, is generated in these coils, and is delivered to the mains where it is ready to set up a flow of current through any device connected with them. The small current necessary to magnetize the field coil is also derived from the mains.

Thus it is very simple to outline how a coil of wire, revolving in a magnetic field, has induced in it an electrical pressure tending to set up a current, but you must not ask the electrical engineer why these conditions produce the electric current any more than you must ask the astronomer why the earth attracts the sun, or the physicist why certain ether vibrations produce light.

The electric motor is much the same apparatus as the dynamo except that its armature, the revolving part, absorbs electrical energy in order to revolve, while the dynamo's armature is revolved by mechanical energy in order that it may give out electrical energy. A small amount of electricity passes through the field coils of a motor, making one pole of the horseshoe a north or positive pole, and the other a south or negative pole. Most of the current, however, passes through the armature, where north and south poles are also established, and these poles being attracted by the horseshoe or field magnets, the armature revolves. There is a sliding electrical contact made by brushes rubbing on a commutator, and by this device the current is conveyed successively through the different coils of the armature in such a manner that its poles are continuously changing with respect to a given point on the armature, but are fixed with respect to the pole pieces, being continuously attracted towards them but never getting there.

Electric currents have many different characteristics. They are of high or low voltage, of constant quantity or of constant pressure, direct or alternating. It would take too much time to explain all these different details, and so only the more important points can be brought out, and those briefly. A direct or continuous current of constant pressure passes through the circuit in the same direction all the time. As it is generally desirable to raise the pressure to one or more thousand volts, when transmitting energy more than a couple of miles, the direct current is often not the most economical one to use, because its voltage cannot be raised or lowered conveniently except by expensive moving machinery. The necessity for using high pressure proceeds from the fact that the loss in transmission is equal to the resistance of the line multiplied by the square of the current, and it is therefore desirable to have the current as small as possible. To do this, and keep the energy in the circuit unchanged, the voltage or pressure must be correspondingly increased, as you will readily see if you remember that the energy in watts equals the current multiplied by the pressure.

The alternating current is one that flows through the circuit

first in one direction and then in the other. At one instant there is absolutely no current in the wire, then it rises gradually to a maximum, then falls to zero, begins to flow in the opposite direction rising to a maximum, and falls again to zero. This complete operation is ordinarily repeated about one hundred and twenty-five times each second. The alternating current is usually generated at a very high voltage, transmitted to the place where it is to be utilized, and then transformed down to a safe voltage by means of a stationary transformer. And thus for the past few years alternating currents have been employed quite largely for transmitting energy over areas of scattered population and over long distances. We hope it is now clear why sometimes the direct and sometimes the alternating current is found in various towns and cities.

Hoping that these explanatory and theoretical considerations may have proved helpful, we now pass to what concerns you most, —the applications.

As far back as 1840 it was an evident fact to many scientists that electricity could be used to great advantage for producing light, if only some way could be found for subdividing the current, and many were the unsuccessful attempts made to do it. On October 11, 1878, there was a panic in gas shares on the London Stock Exchange, caused by the announcement that Edison had subdivided the electric light. This was only a false alarm, and it was not until after 1880 that electric lighting became a commercial fact. It was not until then that electricity in dentistry became practicable. There were primary batteries strong enough to do the work, to be sure, but where was the dentist who could afford the time, to say nothing of the expense, required to make such a device operative. Storage batteries were not yet perfected. These outfits were imperfect electrically and mechanically; the battery was a nightmare to the average man, and the motor was a cheap inefficient and unsatisfactory affair.

The advent of the incandescent lamp into the dentist's office brought with it another benefit besides the superiority and convenience of the light. It solved the problem of supply, by placing the current on tap, so to speak, for any and every purpose; and a temptation to improve his methods was put in the way of the dentist. With sufficient knowledge and proper apparatus there are very few processes connected with dentistry which may not be benefited by the use of electricity, and the profession is realizing this fact more and more.

Now a word concerning the commercial currents that the den-

tist is likely to meet with. And at the outset we wish to correct a wrong impression, that seems to be in the minds of many people, concerning the words "Edison's current." There is no such thing as an Edison current. It is much more proper to say simply an electric current. There is, however, an Edison system of generating and distributing electricity, and this system is so widely used that dentists have come to think of the system as the thing. There are also others in use. The Edison system uses a direct current at one hundred and ten volts constant pressure, and is mostly applied to incandescent lighting. A distinction is made between high and low pressure currents. Low voltage varies from fifty to one hundred and ten, and is used for house service, while the high voltage varies from three hundred to five thousand, and even more, and it should be remembered that this is dangerous to life and property. If high voltage is ever used it should be only under the supervision and advice of a competent engineer.

There are two classes of electric dental apparatus,—that designed for the low voltage current of fifty or one hundred and ten volts, and that designed for the much lower voltage of four or six volts, and so the expression "low voltage apparatus," when applied to dentistry, sometimes means four or six volts, and should not be confused with the term as used commercially. The direct current is usually delivered at one hundred and ten volts, while the alternating is usually at fifty-two volts pressure. For office lighting either current is equally good. So long as a given amount of energy is absorbed in the lamp it matters not whether the current is steady or alternating in direction. The rise and fall of the alternating current is so rapid, as you will remember, that no change in temperature of the filament has time to take place.

One of the most beautiful applications of electricity in dentistry is the use of the various forms of miniature lamps varying in size from a fraction to several candle-power. It is sometimes absolutely impossible to tell whether or not a tooth is perfect simply from its appearance under normal conditions. By placing a small lamp inside the mouth, however, the perfect teeth appear evenly translucent, while fillings, cavities, and dead teeth are clearly pointed out, as there is a marked difference in their appearance. This is well illustrated by the following case. A young girl had suffered for five years from a sore or fistula under the chin. At different times two surgical operations were performed, each of which seemed successful at first, but each proved only a temporary remedy. Her teeth had been examined twice by competent den-

tists who pronounced them sound. She finally came under the notice of a dentist who was not satisfied with an examination made only by the aid of daylight. He made use of a mouth-lamp, and on darkening the room, was able to see that a tooth was opaque and quite dead. He drilled into it, cleaned it out, treated it, filled it, and another slight operation being performed, a permanent cure was effected.

Mouth-lamps are often operated by primary cells, which, however, is not a very satisfactory method. But they are very successfully operated by storage-cells. A very low voltage commercial current would be the ideal thing. This, however, is not available. Very often a current of about one ampère is passed through a thirty-two candle-power, one-hundred-and-ten-volt lamp, and then through a small mouth-lamp. This does the work, but cannot be very highly recommended. It is in fact sometimes emphatically to be condemned. The energy to produce thirty-two candle-power of light is used when only one or two candle-power is required. This means a vast percentage of waste, although the actual amount is really small, as the time is usually short. When one needs a mouth-lamp at all, one usually needs it badly; so that the expense of using considerable energy for a short time is trifling as compared with the value of the results. But this inefficiency is only a minor fault. The chief objection is in bringing a lamp connected with a one-hundred-and-ten-volt system and capable of conducting considerable current so near to the mouth.

It would be an improvement if the resistance were in two parts, half being placed in each of the leads which go to the small lamp. Wires of opposite polarity should also be kept as far apart as possible. If every precaution is taken, if the best of materials are used, and if one has a thorough understanding of the principles involved, then this system may be recommended This may be a good place to state that the physiological effect of electricity passing through the body is due entirely to the strength of current, and not in the least to voltage, except as increased voltage means increased current. Thousands of volts may be taken if the resistance in circuit is large enough to keep the current within safe limits. A much smaller strength of current than is generally supposed will produce deleterious effects when passed through the human body.

Those dentists who are supplied with the alternating current have a considerable advantage over the users of the direct current in the matter of lighting small candle-power, low voltage lamps, and indeed in running almost all low voltage apparatus. This fact

is not generally very well understood by dentists, and very few have made use of it as yet. The transformation of the alternating current from fifty-two or one hundred and ten volts down to four or six for all kinds of mouth-lamps, for hot-air syringes, for cauteries, for root-canal dryers, etc., is safer, more convenient, more economical, and more scientific than methods used with the direct current, where the voltage is reduced by office lamps, or other resistance.

After once getting the commercial current into the office, and having installed the electric light for illuminating his office, the dentist is ready to take advantage of the most useful of all electric dental apparatus, the motor-driven engine. A good engine should be simple, noiseless, easily cared for, flexible, and not too bulky. The moving parts should be reduced to a minimum; bearings should be self-oiling, or else few and easily accessible; the armature or revolving part must be well balanced, and the whole should be so mounted as to minimize any vibrations. If it is fastened to the woodwork felt might be inserted between the frame and the wood, and the bolts could be supplied with rubber washers. The motor should have a half dozen different speeds, although ordinarily, perhaps, but three or four will be required. The usual method of changing the speed is by means of a rheostat, and this should be controlled by the foot of the operator, leaving both hands free at all times. The motor should be reversible, and it should have some kind of a brake, a very ingenious method being to cut the supply off from the armature, at the same time short-circuiting it on itself, thus converting the machine into a dynamo. The rush of current which is immediately generated stops it instantly. The machines on the market which best meet these requirements make use of the direct current. Those who have only the alternating current are under a disadvantage, in that the alternating current motors on the market are rather inferior to the direct current motors when used for driving electric dental engines. This is only to be expected when it is remembered how comparatively short a time the alternating current motor has been in practical use. There are a number of very good constant speed alternating current motors that revolve always in one direction, but, as has been pointed out, the dental engine requires variable speed and the reversibility of the direction of rotation.

Perhaps the chief advantages in the use of the electric engine are that it enables the operator to work more firmly, conveniently, and rapidly, not having to pump his engine by foot-power, and that it enables him to do a longer day's work with less fatigue. There

are several minor advantages, but they need not be mentioned, as those already named would seem to be sufficiently great in themselves. The electric engine is found to be such a benefit, luxury, and sometimes almost a necessity to a dentist having a large practice, that, although best supplied from the commercial current, it often proves worth while to go to the bother of installing batteries when no other means are available. It is not uncommon for a man who uses an electric dental engine to say that he would not part with his apparatus for comparatively large sums of money if he could not replace it.

Batteries may be divided into two classes: primary and secondary. For the dentist's purpose the distinction between them is that the energy furnished by a primary cell can be drawn upon only at a very slow rate, as it will furnish only a very weak current. The storage cell, which, as its name indicates, must first be charged by the action of a current from an outside source, is of such a nature that it can give up its energy as rapidly as the operator needs it. The reason for this phenomenon is largely due to the high internal resistance of the primary cell, which cuts down the circuit, while the low internal resistance of the storage cell allows the current to depend for its strength upon the resistance of the outside circuit. Primary cells are sometimes classified under open or closed circuit cells, a closed circuit cell being one which, to be kept in operating condition, must be allowed to pass a current on closed circuit continuously. Such cells usually have two liquids separated from each other, which tend to mix as soon as the current stops flowing. An open circuit cell can be used to furnish a current for only a short time, and must be given long intervals on open circuit, during which it recovers its strength. These qualities, added to the unpleasantness of creeping salts and the time consumed in caring for primary cells, render them very objectionable for dentists' use.

From time to time there appear upon the market primary cells purporting to be the results of years of study, which are guaranteed to put in the hands of the dentist a store of energy which will work all his apparatus quite satisfactorily. These cells are almost all variations of the chromic acid cell, and cannot be classed under either the open or closed circuit type. They will furnish a fairly strong current it is true, it being possible to run a lamp or a small motor with five or six good-sized cells; but they will consume considerable time and care and a good deal of money in zinc and chemicals, and they have but a short life.

If a battery must be used let it consist of storage cells, and have them charged by some one who makes a business of doing such work, or, still better, install a set of closed circuit gravity cells which are to be kept connected with the storage cells night and day. The energy delivered by the gravity battery is accumulated by the storage battery, and is thus made available. To insure success, however, the gravity cells must be set up properly in the first place, cleanliness must be observed afterwards, and the water must be replaced as fast as it evaporates. Many people have had sad experience in handling batteries, and will advise others to have nothing to do with them. We are only too glad to admit the excellence of this advice when the proper commercial current is available, or if the batteries are likely to receive little or no care. This system calls for about three storage cells, of fifty ampère hours capacity each, and from nine to eighteen gravity cells. If the cells are to be sent out to be charged there should be two sets. These cells should be of one hundred and twenty-five ampère hours capacity. We will repeat once more that a small amount of attention at frequent intervals, an understanding of the nature of the particular cell used, and perfect cleanliness are the chief points to be considered in caring for a battery. We may appear to have given this subject undue space, but we wish to clear the matter up and put it in its true light.

Electrical energy may be used to great advantage for heating water for the water-syringe, and for sterilization, for heating air for the air-syringe, for producing an intense heat for fusing porcelain, and for annealing gold and softening gutta-percha. The electric gold annealer takes the place of the alcohol lamp or bunsen burner, and has many advantages over these for annealing gold. In it a continuous heat may be obtained of fixed intensity. If a rheostat is used in connection with it a number of different degrees of heat may be produced, and so the best temperature for any special gold may be obtained. A much lower temperature is required for gutta-percha than for gold, and it may be set on a tile or soapstone slab which is placed on the annealer. The gold may be put on the annealer before the operation of filling the tooth is begun, and, as the necessary heat required to anneal the gold is not enough to burn it, it may be kept heated continuously while the filling is going on. The heat not being great enough to withdraw the temper from the plugger-point, the gold may be picked up directly without transferring from pliers to plugger. In this way the work goes on rapidly, and much time is saved.

The use of the alcohol lamp has been called a nuisance, for it is dangerous and it is expensive. A bit of carbon caught up from the wick might render a gold filling worthless. It is impossible to anneal gold evenly by holding it with a pair of pliers and passing it through a flame. The edges may be burned before the part touching the steel is fairly warm, for the steel conducts the heat away from the gold very rapidly. With the use of the annealer, however, the gold is not only heated to the proper degree, but the annealing is absolutely uniform.

In closing it might be well to summarize the various pieces of apparatus. The pieces that have a large use at present are the engine, the motor for running the laboratory lathe, the office lamps, the mouth-lamps, the electric fan, the hot-air syringe, the root-dryer, the cautery, the hot-water heater, the electric furnace or oven, the gold annealer, the soldering iron, and apparatus for producing local anæsthesia.

We have outlined a good many applications of electricity in dentistry, and with their aid the dentist has the power of doing better work, more conveniently, and in a shorter time, and they will enable him, therefore, to receive a comparatively larger remuneration. We should not ordinarily advise a dentist to try to make use of all these applications at once, but rather to get those that seem most important for his work first, and let the others follow gradually. The old-time advice applies,—slow but sure.

We have not treated this subject at all completely,—indeed, it would take a small volume to do so; but we hope we may have aroused a new and lasting interest in the use of electricity in dentistry. Gentlemen, we thank you for your kind attention.

CATAPHORESIS.[1]

BY HENRY W. GILLETT, D.M.D.

Mr. President and Gentlemen,—It was with some hesitation that I accepted the invitation of your committee to speak to you on this subject this evening, for the reason that I have but little new material to add to what I have already published. Consequently I

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[1] Read before the American Academy of Dental Science, April 1, 1896.

must confine myself largely to further elaboration of matter already published, and to the consideration of the statements recently published by other workers along this same line.

As an introduction and a probable help to some of you in grasping more fully what follows, let us define certain technical terms which it will be necessary to use. To many of you this will undoubtedly be superfluous, but I find a majority of the profession are not sufficiently familiar with these terms to use them understandingly. I trust, however, that it will not be long before our schools shall recognize the growing demand and the necessity for providing instruction in electricity instead of leaving it to private post-graduate enterprise and the commercial agents of supply-houses, the present most readily accessible sources of instruction for the professional man.

It is well understood by all, I presume, that the term electrical current is used for convenience, and as the result of long habit. In the early history of the development of our knowledge of electricity, it was thought that the manifestations indicated a flowing current comparable to a current of fluid, so we have the term electric current, which seems unlikely to be supplanted. In speaking of this current we need units of measurement of its different qualities. We have these in the ampère, volt, ohm, coulomb, etc.

This term, coulomb, at present one of the least used but most important terms, is the unit of quantity. I refer to it here for two reasons: first, as an aid to the understanding of the ampère, and, secondly, because I believe it will eventually be one of the most commonly used terms. If your bill from your electrical supply company should charge you at a certain sum per thousand coulombs of electricity, it would correspond exactly to the usage of your gas company in their charging a certain sum per thousand cubic feet of gas.

Having a unit of quantity, we next need a unit of current strength or rate of flow. We have this in the ampère, which is the current strength, which allows one coulomb of current a second to pass a given point in the circuit, and corresponds in usage to cubic feet per second of gas or water flow.

For instance, five ampères of current flowing one second deliver five coulombs of electricity, in ten seconds it delivers fifty coulombs.

In medicine we use comparatively weak currents, and consequently measure it in thousandths of an ampère,—milliampères.

In the volt we have the unit of electro-motive force, correspond-

ing to our usage of pounds pressure per square inch in gas, steam, or water.

When we modify the one-hundred-and-ten-volt current so as to use a ten- or twenty-volt current from it, we do something which we may illustrate by the dam of the millwright. Let us suppose he has a twenty-foot dam, and a flume from the bottom of it for his main millwheel, where he may use all the pressure he can get from his dam; but for some other small machinery, let us suppose, he leads a flume out five feet from the top to run a small water-wheel requiring less pressure. With this selector we tap the one-hundred-and-ten-volt circuit, with an adjustable contact, and draw off from it any part of forty volts in pressure that we may wish to use.

One other term, resistance, has an obvious meaning, it is the opposite of conductivity. You know, for instance, that copper conducts electricity well, iron conducts it less readily, and German silver least readily of our commonly used metals; conversely, we say that the resistance of copper is less than that of iron, and that of German silver greater than that of iron; that the resistance of distilled water is very high; that of a sodium chloride solution low; that of the tissues of the body higher than the substances we have mentioned except pure water, and that of a dry tooth very high. The resistance of a conductor also depends upon its dimensions. A large wire will conduct more current than a small one; a large surface of the body covered with an electrode will conduct more current without pain than will a less portion of the same surface. We measure this resistance in ohms.

The ohm is the resistance of a column of mercury of a certain size and length; roughly, it corresponds to the resistance of four hundred and sixty feet of ordinary telegraph wire.

The terms positive and negative scarcely need defining. The positive, indicated by the plus (+) sign, being applied to the current coming from the dynamo or battery; the negative, indicated by the minus (—) sign, being applied to the return current. Electrode is a term commonly used to describe the applicators used in administering electricity. The positive electrode is often called the anode, and the negative the cathode. We have several subdivisions of electricity and kinds of electric current, but we are concerned to-night with but one kind, the continuous or galvanic current, such as is used for incandescent lighting, or is obtained from any form of primary battery.

Now, it was discovered years ago (1858, to be exact) that the

galvanic current would carry with it into the tissues of the human body such liquids as tincture of aconite and chloroform.

Richardson, who made this discovery, subsequently retracted his statements, but others took the matter up at different times. Late in the eighties Peterson, Morton, and others did valuable work in developing the principle and process, which had come to be known as cataphoresis. Many other terms have been used to describe it, but this seems still to be the favorite. In a paper published in the February number of the International Dental Journal, I quoted many of Dr. Peterson's experiments and his references to the earlier history of the principle. In that paper I attempted to give, as concisely as possible, an outline of the development of the use of the principle in medicine.

Cataphoresis has been for some years a process of recognized value to the electro-therapeutist. For further information on the history of its use in medicine I would refer you to the article mentioned and to the references made there.

Now let us consider what happens when we perform cataphoresis in any tissue.

We apply a suitable galvanic current to the tissue by means of suitable applicators or electrodes, the current flows through the tissue from the positive to the negative electrode, and it carries with it a portion of any fluid having the right properties, such fluid being placed on or in the positive electrode.

This property of the galvanic current seems to be partly or largely a mechanical effect. It is stated by Morton that he has driven powdered graphite deeply into the sweat-follicles of the skin by this means. A globule of mercury can be driven back and forth in a tube containing dilute sulphuric acid by alternating the application of the positive and the negative current to wires dipping into the fluid at each end.

I have here an example of what happens if you use a copper electrode. In this case we have decomposition of the copper electrode itself, then cataphoresis of the resulting copper salt. It was done in this way. The copper wire was thrust into this piece of steak and made the positive electrode, another wire was thrust in at another point and the current turned on. You observe the spreading and penetration of the green stain into the meat.

With your permission I will now quote from a previous article of mine some experiments bearing more directly on our use of the current. (See February number of the *Dental Cosmos.*)

You will find at the end of the same article several cases from

practice, and others are cited in my article in the February *Dental Cosmos.* I might quote to you many more, but it seems unnecessary.

Now let me define what I meant a few moments ago by a suitable galvanic current. The current from any set of primary batteries or any continuous current lighting system answers the requirements. It is, however, very desirable that the current supply be steady. I am told that your system here in Boston is not satisfactory in that respect. This fluctuation, of course, may come either from unsatisfactory conditions at the central station, or from large intermittent demands upon the system made by the running of machinery subject to sudden stopping and starting. When a suitable street current is not at command, a dry battery outfit seems to me to offer the best source of current-supply for this purpose. In fact, I am beginning to question whether the dry battery outfit, which the manufacturers of the selector have prepared to go with it, is not the best source of current-supply. It certainly has the merit of steadiness of current and of not needing attention in caring for it.

Now as to electrodes: for the negative, the ordinary sponge-covered electrode is suitable. The sponge, however, soon becomes dirty, and I prefer to strip it off and use for each patient a fresh piece of cottonoid or other absorbent material. The positive electrode varies according to the part to which it is to be applied. For obtunding or bleaching dentine a platinum point is needed, which is to be applied to cotton placed in the cavity or to have cotton wound upon it. For obtunding soft tissues the most successful electrode is that suggested by Morton, having a reservoir which feeds the solution to be used to the absorbent layer between the metal of the electrode and the skin. It is necessary for satisfactory results from cataphoresis that the metallic conducting medium shall come close to the tissue to be effected. As to drugs, there are many that may be used, and more will undoubtedly be found useful for different purposes, but to-night I wish to confine myself especially to three. The first is cocaine, with which nearly all my own work has been done. When an aqueous solution of cocaine of fifteen to thirty per cent. is placed in a sensitive cavity so insulated from the soft tissues that the current must go through the tooth, and the positive electrode is applied to this cotton, and a current of suitable strength is passed for a varying length of time, enough of the cocaine will be carried into the dentine to induce there the normal cocaine effect. The time required to produce this effect varies with the conditions.

For absolute insensibility to such cutting as we need to do in preparing a cavity for filling, ten to fifteen minutes is average time. In some cases the time will be less than this, and in others it may require considerably more. With patients very sensitive to the electric current, it takes more time to reach a voltage which will accomplish the work quickly. A voltage of ten or twelve is sufficient, fifteen or twenty is more rapid in its effects, and thirty or more may be used in some cases. A better method of measurement, and in fact the only correct one, is to use a milliampère meter and gauge your dosage by that. The same voltage produces very different effects as regards quantity of current in different teeth. If we wish to bleach a pulpless tooth we cleanse the cavity, and fill the upper third of the canal as usual, and apply on cotton to the exposed dentine a twenty-five-per-cent. aqueous solution of pyrozone. This is made by shaking two parts of twenty-five per cent. ethereal pyrozone with one part of water, and allowing the ether to evaporate. The tooth being insulated by the rubber, such current as the patient can comfortably bear is pressed, and the tooth will be bleached in a comparatively short time, provided, of course, the coloring is one to be effected by the pyrozone.

Guaiacol has been advanced as a candidate for use as an anæsthetic agent. Some time ago it was announced in Paris that guaiacol had marked anæsthetic properties and that it was superior to cocaine in this respect. It was recommended to be used hypodermically, but with the warning that it would produce sloughing at the point of injection. Acting upon this hint Morton claimed to have found that guaiacol used cataphorically on the skin would produce anæsthesia in about half the time that was required for cocaine solutions to produce the same effect. He tried the addition of cocaine to guaiacol, and used it on two teeth, on mucous membranes of the mouth for implantation, and for other operations. He reported excellent results, but it has since been stated that there is considerable sloughing when it is used cataphorically on mucous membranes. I have not yet ventured to try it in sensitive dentine, though I have seen it successfully used. I fear its escharotic properties may do injury to the tooth. McKesson & Robbins, who have made up the combination of guaiacol and cocaine which they call guaiacocaine, assure me through their agent, that we may hope to see a guaiacol free from these escharotic properties. Guaiacol, as you know, is a synthetic creosote. It is stated that it contains one and a half per cent. of hydroxyl, to which are ascribed its escharotic properties. It is hoped by the firm named that they

may be able to get a product free from hydroxyl. If they are able to realize this hope, and the results are what they expect, we shall undoubtedly have a very valuable drug in the combination guaia-cocaine. Its action will be more prompt than that of cocaine alone, and the guaiacol will serve a very valuable purpose when the combination is used in soft tissues in retaining the cocaine, and preventing its rapid distribution to the system. It is stated that when cocaine is added to a mixture of guaiacol and water, the guaiacol takes up eighty-six per cent. of the cocaine, leaving only fourteen per cent to the water. We now come to the apparatus required and the technique of making the application to sensitive dentine, or for bleaching, the only difference being that for bleaching you may use more current, and may add the current in larger steps. A switch is provided on the one-hundred-and-ten-volt selector for this use.

The ordinary electric apparatus used by the medical profession is very nearly useless in making applications to sensitive dentine. The living tooth is much more sensitive to the irritation of the electric current than most other tissues of the human body. Some subjects are so sensitive to its effects that the increase of pressure even in the quarter-volt steps given by this selector is apparent to them, in the early stages of the application to sensitive dentine.

On the other hand, some subjects are able to bear the full one-hundred-and-ten-volt current when it is choked down in flow, as described by one of your Boston practitioners in the March INTERNATIONAL DENTAL JOURNAL. I have taken such a current as he describes through sensitive dentine without finding it unbearable, but for the subject markedly sensitive to the galvanic current such a remedy is worse than the disease. I began my work a year ago with an apparatus giving just about the results he describes, but soon found it necessary to modify it, and when I found the key to the problem I also found my original expensive apparatus to be useless. I would say that the dangers referred to in the article mentioned are imaginary in a properly-made apparatus.

This fractional volt-selector, made for me by the Electro-Therapeutic Company, of New York, has been especially adapted to the needs of the dental operator. As I have intimated, it is so arranged that the current is added in quarter-volt steps. The ability to do this is an essential factor to the general use of this method of obtunding sensitive dentine. Given this ability to control the current, and any sensitive cavity that is so situated that the current can be made to travel through it, and through the tooth, and anæs-

thetics can be forced into the dentine with no more discomfort than will be readily borne by sensitive patients. The dial at the top of the selector is a volt index. It is not absolutely, but is very nearly, correct for such currents as are likely to be used with it. The electrodes needed are the ordinary sponge electrodes, and a needle-holder for the piece of iridio-platinum wire for the positive electrode. A milliampère meter is very desirable also. With this selector it cannot be said to be an absolute essential, since you have in the voltage and in the patient's sensations two guides. It is, however, impossible to know what quantity of current you are using unless you do have a meter, and I would not willingly dispense with one. It should be so arranged as to register five milliampères on a scale a couple of inches long, so as to have a considerable movement of the needle for each milliampère.

The technique of administration is simple. If possible, apply the rubber dam. If the cheeks and mucous membranes can be kept away, and the parts kept dry enough so that the current will not flow off through the other tissues, it will do as well, but it is usually much easier to put on the rubber at once. Next see that any metal fillings, near enough so that the current may reach them either by contact with the cotton, the electrode itself, or by the surplus of the anæsthetic solution flowing along to them, be insulated by covering with soft gutta-percha, wax, varnish, or other non-conductor. Select a pellet of cotton loosely rolled, and of such size and shape as will about fill the cavity, saturate it with a freshly made twenty- or twenty-five-per-cent. aqueous solution of cocaine, and place it in the cavity. The sponge of the negative electrode should be well wet with water or dilute salt solution. The patient may hold it in the hand if preferred. I generally let either the patient or my office attendant hold it on the side of the face or neck. Having the selector conveniently placed at the back so it can be reached with the left hand, the current turned on at the switches, and the knob turned back till the needle stands at zero, apply the positive electrode to the cotton, and slowly turn on the current by the knob on top. Keep your contacts steady and watch your patient. Usually at from three to six volts the patient will begin to feel the sensation due to the flow of the current. This first sensation cannot be called pain: most subjects speak of it as a feeling of cold. As the patient begins to show that the sensation is beginning to be painful, pause in the turning-on process, or even turn it back a bit. Explain that after a moment's rest the sensation will grow less. Take this opportunity to explain that the

current is entirely under control; that it is not necessary to give pain, but the current should be added as fast as may be borne without real discomfort, and that the stronger current works much faster. After a period varying from fifteen seconds to two minutes you will usually be able to go on, adding current gradually. If I am able to get as high as a fourteen- or fifteen-volt current in the first seven or eight minutes, I generally continue the application only nine or ten minutes. If it takes me longer to get to fifteen volts, I am apt to continue the application for fifteen minutes, especially if I have a very sensitive cavity to deal with. I have absolutely benumbed the dentine of cavities in seven minutes for patients who could take a good deal of current. You soon get to know about what each patient needs. If, in turning on current, you find that after ten volts or so have been turned on you can add two or three volts at a time, you may know that the cocaine effect is well under way. When the dentine is anæsthetized you can usually go on adding current rapidly up to thirty or forty volts if you wish. I consider a voltage of fifteen or twenty an average application. If you have a milliampère meter, and find it recording anything from one-third of a milliampère to two milliampères, you may be sure of ultimate success, even if you can use only a low voltage. Very marked sensitiveness to the low voltages is present when there is an exposed pulp below the softened dentine. An exposed pulp will not readily bear as high voltages as dentine will, and in these cases your meter will record more current. Having completed my application, I turn the current back nearly to zero, and remove the negative electrode first. If the patient is one not very sensitive to the current I do not trouble to turn back to zero, but break contact gradually by sliding the negative electrode off slowly. I then go on with the excavation as usual, bearing in mind that I may penetrate through the anæsthetized layer. If this is done a second application may be made, in which you will be able to turn on current much more rapidly, and need shorter application. In my sensitive cavities I find I make up the time by reason of the increased speed possible in doing the cutting afterwards. In many cases I have been able to anæsthetize, completely and painlessly, dentine for patients for whom I have previously been unable to find any relief. I find no cases of sensitive dentine that cannot be controlled when cocaine cataphoresis can be employed. I anticipate being able to control them with less expenditure of time as we gain experience with other drugs.

PORCELAIN FILLINGS.

BY ELOF FÖRBERG, STOCKHOLM, SWEDEN.

I HAVE been using porcelain fillings on a large scale since 1883. The material I use is of three kinds: (1) artificial teeth; (2) cylindrical bars; (3) body and enamel for fusing. Of artificial teeth the English ones, I consider, are the best, as their substance is more homogeneous than that of the American, and they are therefore more suitable for grinding. I use the American (How's) crown only when it is a question of repairing a broken corner of an incisor, where more or less of the cutting edge has to be replaced, and when, therefore, with a view to strength, platinum pins are considered requisite. This crown is hollowed out at the back, and therefore very thin, and it is provided with four thin, pliable platinum pins, which can advantageously be used as fastenings for the porcelain filling.

My method of using parts of artificial teeth as fillings has been explained by me at the meeting of the American Dental Society of Europe, at Coblenz, in 1887. It is briefly as follows: Having completely excavated the cavity and finished the edges, I take a piece of colored paper, or somewhat thick tin-foil, and hold this over the tooth surface with one hand, while with the other hand I rub the paper with a polishing-steel, so that the edges of the cavity cut through the paper. In this way I get a mould which perfectly shows the form of the cavity. This mould of paper or tin-foil is then stuck on, with varnish or something similar, to an artificial tooth, the color of which corresponds with that of the tooth to be fitted, when it should be observed that the curvature of the surface of the artificial tooth should be tolerably in accordance with that of the natural tooth; it is preferable, especially in case of a larger defect, to place the mould on that part of the artificial tooth which corresponds with the position of the defect of the natural tooth.

Going by the mould, glued onto the tooth, it will now be easy, by using cutting pliers and corundum or carborundum wheels, to form an inlay that will perfectly fit the cavity, and this can be done in the laboratory, so that all that remains to be done in the operating-room are the finishing touches, which must be from the cavity direct; before doing so the mould should naturally be removed, and the inlay fastened on a metal mandrel with gum-lac or a mixture of wax, rosin, and gutta-percha, which mixture is very

suitable for sticking on pieces with (as well as for using as temporary fillings). When the piece has been accurately fitted, and everything has been made ready for the filling, the piece should be fastened in the cavity with Harvard cement. The cement, which should be well stirred and rather thin, is applied around the edges of the piece, which is then quickly pressed into the cavity, where it should be held with a steady pressure for some minutes to prevent its being displaced by compressed air or otherwise before the cement hardens. Only a thin layer of cement now separates the tooth from the porcelain inlay. The color of the cement should be a shade darker than that of the tooth. When How's crowns are used the piece should, of course, be fitted so that one or two of the platinum pins may be used as fastenings.

If, when, for instance, repairing a partly broken tooth, it is desired to have, on the palatine or lingual side, a material which, better than cement, can resist wear, the cement on that side may be covered with a thin layer of amalgam, or with gold, or one can, before inserting the piece, add melted glass or porcelain, thus forming the contour of the tooth. This course of action is preferable to making the parts entirely of glass or porcelain, inasmuch as one then gets a harder and stronger piece, and it is also then easier to get precisely the shade of color that is wanted.

The porcelain cylinders are naturally intended for cavities which have or can be given a cylindrical shape: thus, particularly for incisors with enamel defects, etc. The cylinders should be about twenty millimetres long and from one and a half to four millimetres in diameter, or nearly corresponding with the inlay drills that are met with in the market. The porcelain substance ought to be thoroughly burned, so that on breaking or grinding it one gets a firm and bright surface, and should be of such shades of color as are mostly met with. My method of using such porcelain cylinders, for which method I claim priority, is as follows: A cylinder, of suitable color and a little thicker than the drill used, is fixed in a porte-polisher with gum-lac or the gutta-percha mixture previously referred to. When rotating in the machine the cylinder is clasped round with a corundum cloth held by the left hand, and is thus ground (slightly conical) until it can just be pushed into the cavity. The cylinder is then moistened with water or glycerin, is dipped into fine carborundum powder, and, while rotating, is introduced into the cavity, where it will then be perfectly ground in. In doing this the hand-piece must be held very steadily, with only a slight pressure on the cavity to prevent the cylinder from break-

ing. The corundum powder is then washed away with water, the cavity is dried, and the cylinder tried. The end of the cylinder is now ground off somewhat, so that the piece, when placed, rests close against the walls of the cavity. It is better not to use too fine a corundum wheel for this grinding, as the cement will adhere better on a rough surface. If the cavity is not too shallow no other fastenings are required for the piece. The cylinder is then marked to the depth it enters into the cavity, and it is then cut nearly off at that place with a thin diamond or carborundum wheel. A thin layer of cement or gutta-percha solution is then applied round the sides of the cylinder, which is then inserted into the cavity with a firm pressure, and held there until the cement has partially hardened. With a slight movement of the hand the cylinder is then broken off at the place cut through. Some melted wax or paraffin is then poured on with a spoon-shaped instrument. The piece is not polished until the cement has hardened well. If these cylinder fillings are carefully done and well polished with Arkansas stone, etc., it is quite impossible to distinguish them from the natural tooth when standing a few paces off. The advantage of this method with cylinders instead of common inlays is that the cylinder can safely be fixed in a porte-polisher, and thus ground against a corundum wheel and cloth, as well as in the cavity itself, without the risk of slipping, which, with small inlays, generally is the case, even though they be fixed on metal mandrels. The cylinders can also be used for cavities of an oval or other shape when they are ground in as common inlays and cut off as previously described. Even then one has the advantage of being able to hold the piece well fast while working.

The way of using enamel for moulding is well known. I only want to mention a few details of my way of procedure. Having pressed the gold-platinum-foil well up, thereby using cotton and polishers, I pour some hard wax (consisting of one part of wax and two parts of rosin) into the mould thus obtained. I then pack the wax well, while it is hardening, and also press it over the surface of the tooth. By this means I get a very good cast of the cavity, and also prevent the gold-platinum mould from altering shape while being taken out of the cavity; and, lastly, I can get a plaster-cast model of the tooth, whereby I can better see the shape of it when forming and fusing the porcelain filling. I now mostly use Reisert's enamel, which is melted in an oven. In order to obtain a natural color a somewhat yellow enamel should be used at the bottom, and on top of that the color chosen. I generally also add

some continuous-gum body to the first layer. I formerly used a heated instrument for pressing the inlay into the cavity, but it seemed to me as if that rendered the cement less durable. In cases of approximal cavities I generally use a thin linen band for pressing in the piece and removing the superfluous cement.

The question as to what cavities are particularly suitable for porcelain and glass fillings I think I must answer as follows: Fillings of the kinds mentioned are suitable for visible defects in the incisors, cuspids, and (possibly) bicuspids. I have used Roustaig's cement as long as it could be had, and afterwards Harvard cement. As regards the question how long a time these fillings will last, it depends upon three factors,—viz., (1) the condition of the cavity, (2) the degree of thinness to which one has succeeded in reducing the cement layer, and (3) the amount of attention the patient gives to his mouth.

The cavities should not be too shallow (especially not cervical cavities, in which it is, as a rule, difficult to get durable fillings). I have several cases where porcelain fillings, in larger cervical cavities of irregular shape as well as in cavities which cover the whole of the approximal surface and half of the cutting edge of incisors have lasted ten to twelve years, nothing having been done to them in the mean time excepting refreshing the cement stripe a little once or twice. The most durable are naturally the cylinder fillings, because, having rotated and ground itself into the cavity, it fits so perfectly that the cement layer is absolutely as fine as a hair. Here, as elsewhere, hygiene plays an important part. To insert a series of porcelain fillings into cervical cavities on a person who, on account of neglect (or of chronic gingivitis), has the cervical parts of his teeth covered with deposits is, I consider, labor totally thrown away.

The last question, whether porcelain fillings can be considered as a satisfactory substitute for gold, aside from æsthetic considerations, has previously been partly answered by the mentioning of porcelain fillings which are now ten to twelve years old, and which, by all appearances, may last as long again. It may generally be said that porcelain fillings can rival gold fillings in durability in cases where they, with a minimum cement layer, touch upon tolerably firm enamel edges, and where, in biting, their surface does not articulate against the opposite teeth.

PYORRHŒA ALVEOLARIS.

BY DR. EUGENE S. TALBOT, CHICAGO, ILL.

The October (1896) International Dental Journal contains (Notes and Comments) the following:

"Pyorrhœa Alveolaris.—In listening to Dr. Talbot's paper upon pyorrhœa alveolaris, read before the Academy of Stomatology of Philadelphia, we noted his remark that a general invasion of this disease—that is, attacking all the teeth—'never occurs.' This is an error, as such cases frequently occur, and, no doubt, are observed by many practitioners. The writer has treated more than one case in his own practice, where every tooth was affected, and has met several in the college clinics."

Substantially the same views are expressed in an editorial in the April (1896) *Dental Cosmos* by Dr. Edward C. Kirk:

"The statement that a general invasion of the disease, including all of the teeth, 'never occurs' is an error of fact, as such cases frequently occur, and have probably been observed by most practitioners. As a matter of fact, such a case is reported by Dr. William H. Trueman in the discusion of Dr. Talbot's paper in this issue."

These are criticisms of the following views expressed as to the uric acid theory of pyorrhœa:

"If this theory, moreover, were correct, the deposits, which are in the capillaries in a liquid state, surrounding the teeth, would attack all the teeth at the same time, and deposit equally, or nearly so, around the root of each tooth, which never occurs."

Neither seems to understand the point aimed at. The mere reference to the deposits in the capillaries in a liquid state was sufficient to show that the incipient stage of the disease was meant, and not the stage inferred by Dr. Kirk in quoting the case cited by Dr. William H. Trueman in the discussion of my paper. I have treated many cases of the type mentioned by Dr. Kirk and the "Comment," and so has every other dentist. But this is not the point aimed at. If pyorrhœa were due to uric acid or gout, deposits would take place in the tissues about the teeth just as they do in and about the joints, and all the teeth would become affected at or nearly the same time, which is never the case.

It would take years to produce such a condition as cited in the "Comment" and the case referred to by Dr. William H. Trueman from the incipiency of simple inflammation.

Pyorrhœa is not a spontaneous disease in which all the teeth become involved at one time, but is the result of simple inflammation of the gums about one or more teeth, which become chronic with an invasion of the peridental membrane that may in time extend to all the teeth, or may be confined to one or two teeth, the deposit being the result of such chronic inflammation.

Abstracts and Translations.

REPORT ON A CASE OF REUNITED FRACTURED HUMAN TOOTH.

BY MR. STORER BENNETT.

In December, 1888, Mr. W. E. Harding presented to this Society an upper incisor which had been fractured across the crown, and which he had extracted from the mouth of a girl, seventeen years of age, only three or four days before he presented it. The history of the patient was that some ten months previously she had fallen down, striking the tooth and driving it high up in its socket. It became impacted, and remained fixed in its position, causing more and more irritation up to the time that Mr. Harding saw it. The pain gradually became so intense that there was nothing to do but to remove the tooth. He then discovered that it had been fractured across the crown, in a direction obliquely upward and backward. I was asked to make a microscopic examination of the specimen, and, therefore, removed a vertical section from front to back of the tooth, and the slide now exhibited shows the two outer halves remaining. It was seen that the broken portions of the specimen, though separated by a considerable interval, were firmly knit together by some calcified material which occupied the central portion of the gap. The margins of the space, however, being occupied by a substance of leathery consistence, were not calcified at all. Examined microscopically, the uniting substance was seen to consist of a calcified material of a spongy or cavernous character, with numerous spaces for blood-vessels. The cavernous spaces had apparently been occupied by a substance somewhat resembling pulp, though I do not wish to affirm that it was pulp. In various positions slight absorption of the edges of the normal

dentine has taken place, the spaces thus formed being filled up by cementum showing well-marked lacunæ and canaliculi. The amount of cementum, however, is not very great.

The next slide is a magnification showing the intermediate tissue. Spaces are seen which have been occupied by blood-vessels, and from the black masses little tubes here and there may be seen passing, but there is no space where one can make out a distinct brush of tubes going off, as one would expect if a mass of dentine were present.

The next slide shows a smaller portion of the same thing more highly magnified, but I do not know that it adds any greater amount of clearness to the idea of the specimen. An examination of the specimen suggests to one's mind two different sources for the supply of this new material, either pulp or periosteum. The pulp was exposed, but only to a very slight extent, and, of course it is possible to imagine that enlargement took place, that the overgrowth of the pulp filled up the space between the two fragments somewhat similarly to the way that chronic enlargement occurs in cases of polypus of the pulp, and that ultimately this calcified.

On the other hand, we have evidence that there is cementum in the section, lacunæ and canaliculi being present in certain parts in rather large numbers, and we have *not* the evidence of any definite dentine structure asserting itself. We know that bone may be produced from many tissues other than those which naturally give rise to it. We have here, I think, a case in which hemorrhage having taken place, a natural capping of the exposed pulp occurred, somewhat similarly to the way a wound heals under a scab. Blood was poured out between the fragments, organization took place, numerous blood-vessels were produced, and ultimately calcification occurred, and eventually, if it had been left long enough, I think the whole of the space would have been filled up with calcified material more or less resembling bone, or bone and cementum together. There are many specimens described where cementum has united a fractured tooth in the root, but I think we have here to do with a specimen unlike any other that has been figured or described, in so far as the cementum has been deposited between the fractured portions of the crown.

Reports of Society Meetings.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 667.)

August 4, 1896.—First Day.—Evening Session.

The meeting was called to order at eight o'clock, by the President, Dr. Crawford.

The minutes of the previous session were read and approved.

The Committee on the President's Address then presented its report. An abstract follows:

The subject of dental legislation, which is made a prominent feature of the President's Address, is one which we all regard as of the highest importance, both to the people and to the profession, and we cordially agree that all laws should be framed with a view to affording strict justice to all. None can appreciate more fully than your committee the supreme importance of maintaining high standards in all institutions of dental learning in our country. We also appreciate the great desirability of the enactment by all of the States of similar statutes regulating the practice of dentistry. The conveniences and advantages which would come through such legislation are many and various; but while recognizing all these advantages, your committee are so impressed with the differing conditions now existing in the different sections of our country that we doubt the practicability of securing absolutely uniform legislation in any large number of the States within the near future, and we also regretfully express doubt of the expediency of appointing at the present time a committee to be charged with such undertaking.

The secretary moved that the treasurer be instructed to pay all properly authenticated bills.

Motion carried.

Dr. Abbott.—As chairman of the committee in reference to the examination of the oral cavity in relation to life insurance, I would report progress, and ask a continuance of the committee.

Report accepted, and committee continued.

Section III., Operative Dentistry, was called, and requested further time, as there had been no meeting of the section.

Section IV., Histology and Microscopy, reported that thus far there is nothing to offer from that section.

Section V., Materia Medica and Therapeutics, Dr. Cassidy, chairman, read a report on the process of cataphoresis, of which an abstract follows:

The process of cataphoresis has probably been the most interesting new feature of therapeutics during the last year. Cataphoric medication has, however, been practised unconsciously for some years, by what has been supposed to be electrolysis of certain drugs, in pyorrhœa and other conditions. At the clinics of the Dental Section of the International Medical Congress at Washington, in 1887, Dr. Ames exhibited a simple electric appliance for developing active iodine at the desired point by the electrolysis of potassium iodide. At the same clinic, another gentleman adopted similar means with a solution of sodium chloride to bleach dentine. This is stated merely for the purpose of showing what has been done, and not to diminish the credit due to Dr. Morton and other gentlemen in this matter. The phenomena involved in their production as yet remain unexplained, but the physiological benefits obtained in the majority of cases are accepted facts. Heretofore the effects of electric currents on compound liquids have been studied only in connection with electrolysis, and the questions might be asked,—

Does cataphoresis ever occur free from electrolysis? To this I would answer yes.

Does electrolysis of an electrolyte in porous, solid, or semi-solid matter always give cataphoresis? To this I would answer no; as witness the passage of water in moistened clay towards the cathode without suffering decomposition, and conversely, the decomposition of potassium iodide in contact with gum tissue, where no intromission of the freed iodine is apparent. This latter example seems to prove that at least one of the laws of ordinary electrolysis might be applied with advantage, in many cases, to our choice of drugs. For instance, those whose decomposition will supply the electro-positive radical as the active agent will penetrate more deeply; otherwise, as in the case of potassium iodide, the electro-negative radical iodide will not be drawn or pushed cataphorically towards the negative pole; but when free iodine in aqueous solution is used, it acts most charmingly, owing to the carrying power of the water, absence of chemical action, and consequent non-interference with its passage by a more highly electro-positive radical.

One other rule of electrolysis may be alluded to in this connection,—namely, decomposition of an electrolyte is in the ratio of its

chemical equivalent. This rule may enable some one to construct a list of "cataphorics" by combining in certain proportions a too active conductor with a less active one, as in the case of cocaine hydrochloride and guaiacol.

As is already well known, the action of cocaine hydrochloride is more effective in reducing the sensibility of dentine if it be retarded by a non-conductor, such as some of the phenols, of which guaiacol thus far is preferred.

Dr. Custer writes, "I am satisfied on the following: cocaine, cataphorically applied on the mucous membrane and upon the cuticle as well, is almost, if not quite, as effective as a hypodermic injection. It also possesses these advantages: 1. The application itself, if properly conducted, is painless. 2. There is less danger because the drug is diffused, and it is not possible for the full dose to enter into the venous circulation, as may happen when administered by the syringe. It is when the cocaine is mostly entered into the arteries that the anæsthesia is best and danger least. 3. The danger of septic inoculation is overcome.

A new remedy has made its appearance recently, bearing the name of eucaine, which will probably soon claim a large share of the honors hitherto belonging to cocaine as a local anæsthetic. It is an artificial alkaloid, said to be produced by the reaction between acetone (dimethylketone, CH_3COCH_3) and ammonia. Eucaine hydrochloride presents the appearance of a white, odorless, crystalline powder, of a bitter quinine-like taste, soluble in water, alcohol, and chloroform. As a cataphoric obtundent of dentine, it seems to act favorably, although more experiments will have to be made with it before its virtues in this direction are accepted as satisfactory. It has a decided advantage over cocaine in this particular, that it is probably uniform in its action, other conditions being equal, on account of its immediate derivation from pure chemicals instead of indirectly from vegetable sources. The claim is made that no evil effects have thus far been reported as sequelæ of hypodermic injection for the removal of teeth, although the anæsthesia in point of duration and intensity was fully as satisfactory as that produced by cocaine.

Dr. L. P. Bethel, of Kent, Ohio, then read a paper, of which the following is an abstract:

LINING ROOT-CANALS.

BY L. P. BETHEL, D.D.S., M.D., KENT, OHIO.

In the treatment of teeth with devitalized pulps, a medicament that not only sterilizes the contents of the root-canal but leaves behind an antiseptic deposit which prevents the subsequent development of micro-organisms, would be an ideal disinfectant.

With this thought in mind, I began a series of experiments, some months ago, taking nitrate of silver for the first agent. We know how useful this salt has been in the treatment of certain superficial cavities in the teeth of adults and various cavities in the teeth of children, preventing further decay as long as the discoloration remains. If in this location, where it is exposed to the varying conditions of the oral fluids, it will prevent subsequent delay for a considerable time, why should it not remain unchanged for a much longer period when sealed within a root-canal, and perhaps remain as a permanent barrier to the development of bacteria.

How to get the silver nitrate to permeate the canal so as to coat it thoroughly from pulp-cavity to apex of the root was a question of first importance. Repeated attempts at pumping it into the canal by means of wooden points, broachés, etc., proved unsatisfactory, for the silver nitrate solution would not go beyond the point of penetration of the broach, and the cases most desired to treat were the small, branching, or tortuous canals, where it was impossible to pass even a broach.

By the aid of cataphoresis, however, this silver nitrate was forced beyond where the broach extended, into small canals, etc., as shown by the specimens here presented.

Microscopical examination shows that the nitrate of silver is carried by means of cataphoresis to a greater depth into the tubuli of the dentine, more thoroughly sealing them, than when applied to the surface by ordinary mechanical means.

In the preliminary experiments out of the mouth the silver nitrate was used in connection with various agents, such as sulphate of soda, one-per-cent. solution of sulphuric acid, etc., but the silver nitrate being itself a good conductor of electricity, it was found most satisfactory when used alone in an aqueous solution made with distilled water, to avoid all organic material. Various strengths were employed, from ten-per-cent. to a saturated solution, those giving the best results being from forty-per-cent. to seventy-five-per-cent. solution.

The process of application is a simple one. Adjust the rubber dam, and if the crown of the tooth needs protection from discoloration, apply a thin coating of melted wax to the surface of the crown cavity, then apply the silver nitrate solution to the canal by means of a wooden toothpick or other suitably-shaped piece of wood, pump the solution into the canal with a broach as thoroughly as possible, apply the electrode to the pulp-canal opening, place a pellet of cotton saturated with the silver nitrate solution around the electrode in the canal, and the electricity does the rest. The saturated cotton turns first a light green, which grows darker until almost black, and serves as an indicator.

The time of application will vary according to the condition of the root-canal, its size, whether well opened, strength of current, and per cent. solution used. The higher per cent. solution the better conductor it makes and the quicker it is deposited. From one to five minutes seems to be ample time. After removing the electrode cleanse the pulp-cavity and canal as thoroughly as possible with dilute ammonia, to neutralize the nitric acid formed, and it also hastens the darkening of the nitrate. Then dry with hot air.

In the majority of practical cases I have been using the nitrate of silver after the root-canal has been sterilized, although in several cases it was used without previous sterilization, the cavity sealed, and no further trouble experienced.

This root-canal lining is not advocated for all teeth; indeed, the practitioner must use judgment in its application. It would not be advisable in the anterior teeth, on account of discoloration, or teeth where the foramen is large, as in teeth not fully developed, and others, on account of the liability of forcing it through the apex of the root. Just what would result from such an accident I am unable to say from practical experience. I have tried to force the solution through the apex of a normal root out of the mouth, but in every instance it has penetrated just through the foramen and stopped, due possibly to the forming of an albuminate when coming in contact with the tissues at the end of the root, and thus limiting its own action.

The object of these experiments is to find a means of treating root-canals that are too small to admit a broach, those branching or tortuous, those in flat-rooted teeth, etc., where it is doubtful about inserting a protecting root-filling. If such root-canals are thoroughly lined with the nitrate solution, and it penetrates somewhat into the tubuli, as it does, the probability is that there will be no subsequent trouble, even though the root-filling should be

defective. And, indeed, it is a question whether root-filling would be necessary at all, especially in small canals.

Roots treated by this process out of the mouth, when filed down, reveal the outlines of the canals, their restrictions, obstructions, and, in some cases, unlooked-for branches, that probably would not be found in ordinary root-treatment and filling, and left, perhaps, as a harbor for bacteria in which to multiply and cause subsequent trouble.

This is only the beginning of a series of experiments in this direction. What the future may disclose time alone will tell.

DISCUSSION.

Dr. Abbott.—I have listened with much interest to these two papers, although I have never used what is known as cataphoresis in my office. I have for the last ten years described the process by which work of this kind could be done, but I never yet saw an apparatus which seemed to answer the purpose, or do away with the great amount of machinery that seems to be connected with this sort of work. Still, I fancy, there is a great deal to be gained from electricity in this connection. I do not see much use of nitrate of silver in the roots of teeth. Great care must always be taken with it, especially with electricity, and if it were used with the electrode at all, it would probably be with such force that it would not have a result that would be presentable or acceptable in the mouth. Outside of the mouth this can be done, but in the mouth I do not think its use advisable. I cannot understand why it is that men generally try to get the most difficult way of doing things that can be thought of. Perhaps it is a mode of education that is good, but at the same time I believe it is the duty of every man to learn to do operations in the mouth with the least possible trouble to the patient and himself, and with the least expenditure of time, because time is a great element, particularly where a person is much engaged. All of this cataphoric business means a waste of time, in my judgment, although I may be wrong. The gentleman, in reading the paper, said he could not say what the result would be in case the nitrate of silver were forced through the root of the tooth into the tissues beyond. He knows very well that nitrate of silver is a powerful escharotic, and that it destroys tissue to a certain extent. If it is as strong a solution as seventy-five per cent. it will cause a great deal of trouble, and he will have difficulty in reducing the irritation produced by this material. It is a common thing to force escharotics through the roots of teeth under these

circumstances without doing harm. When I force chloride of zinc through the end of a tooth, I know it is an escharotic and destroys more or less tissue; but I know I can reduce the irritation. I do not know that it goes as far as nitrate of silver; perhaps it does.

Dr. L. L. Barber, of Toledo, Ohio.—In regard to Dr. Abbott's idea of discoloring the teeth, if he will take the pains to coat these with a thin covering of wax, as Dr. Bethel mentioned, introducing the electrode into the mouth of the canal, the current of electricity passing through the source of least resistance, which would be directly down the canal, he would have no trouble as to the discoloration of the teeth. So far as forcing the substance through the apex of the root, I have been doing this for some time, and have made a number of practical demonstrations in the mouth in cases that I have been afraid to do anything else with, and I have not had any trouble so far with any of them.

Dr. Ambler.—It is not intended that this process of applying a solution of nitrate of silver to root-canals should be used in the teeth of young persons where the foramen is large, or where the end of the root has not been entirely formed. A dentist who is accustomed to making operations upon root-canals can determine that fact for himself before he begins to operate. The way this matter came about was this: I suggested that a solution of nitrate of silver be applied to all cavities in teeth which were to be filled with amalgam, for the reason that teeth break away a great many times around amalgam filling, and also for the reason that a great many amalgam fillings either contract or expand. If a deposit of nitrate of silver was made in a cavity after it had been prepared for the filling, and the filling leaked or the wall broke away to a slight extent, or there was a fracture in the wall, there could not be any decay under the amalgam filling as long as the deposit of nitrate of silver lasted. It is not claimed by myself or Dr. Bethel that the application of nitrate of silver is anything new at all; but the claim is this: the application of a solution of nitrate of silver to large cavities in pulpless or live teeth, where it is applied before they are filled with amalgam, or when it is applied to root-canals, —those two points are new, and the first time they were brought out was last May by Dr. Bethel and myself. The matter came about by my experimenting outside the mouth and in the mouth with solutions of nitrate of silver in cavities which were to be filled with amalgam. We do not ask any one to use it or force it upon the profession. We simply tell what can be done, and it can be used in accordance with best judgment, or let alone. It is a very

easy matter to apply it if any one has a cataphoric instrument, because a very small platinum wire attached to a positive electrode can be taken, and after dampening the canal with the electrode dip in the solution of nitrate of silver; then place the cotton in the mouth of the canal, put the electrode through it, and turn on the current. It is all accomplished in a few minutes. The application of nitrate of silver to a cavity before being filled with amalgam can be done without cataphoresis in the old way, but the point of cataphoresis is that it drives the medicament into the tooth-substance, especially so in a devitalized tooth and in a root-canal, deeper than it would if applied by the old method. In a root-canal operated on in this way you have produced an insoluble compound. If there is any leakage or imbibition through the cementum from the outside, there cannot be any penetration of that insoluble compound from the outside, and if the tooth is filled afterwards there can be no leakage from the inside. We claim that that is the most perfect method—as far as the method is concerned, saying nothing about color—that has ever been produced. I have operated on cases inside and outside the mouth, and have experienced no difficulty, because I do not operate on cases which have a large foramen. I have never seen any untoward results from operating on teeth where I could not pass a broach through the foramen, and those are the cases in which I apply this cataphoric method. The doctor has given you in his paper the solutions for use, and I agree with him in those, and consider it a perfect method. The application of wax to a cavity I made and spoke of in December or January last, and; as Dr. Barber says, that is a perfect way. If I do not wish to discolor a tooth I fill up the cavity first with melted wax, and then cut out the centre of it. You have your walls all covered, and the tooth will not be discolored. The medicament itself does not penetrate beyond the wax. You get the deposit in the root-canal. We find, after making sections of these roots, filing away one side of them, that the nitrate has penetrated to some depth. In some of the specimens you will see that where the file has passed over, especially if a fine file has been used, or you have used a burnisher, that it shines like metallic silver. You cannot get any such deposit by the old method.

Dr. Stephan, of Cleveland.—I cannot say that I would indorse this method of using nitrate of silver. It seems to me if this nitrate of silver is decomposed and becomes an insoluble compound its efficiency ceases. The suggestion of applying medicaments to the root-canal by the cataphoric method is a good one, and if we get

some antiseptic which can be carried in there, and which will not decompose, but whose efficiency will continue for some time after, it will be advantageous. As to using the nitrate of silver by the cataphoric process in cavities to be filled with amalgam where the pulp is still alive, I should say that it was entirely out of the question, for the reason that the pulp undoubtedly will die. The nitrate of silver will destroy it. If a metal is placed over this deposit of nitrate of silver, pure silver will be deposited on the under side of the metal, consequently the nitrate of silver will be inert.

Dr. Holly Smith.—It is a source of congratulation that this profession pays tribute to all sciences and all arts, and I predict for cataphoresis a great future. I am pleased with the suggestions made by the paper, but, as the gentleman has said, this is just the beginning of some experiments which have been made. I think we should encourage these experiments I am at a loss to know why the course of electricity should select the canal of a tortuous root partly filled with effete matter, or possibly a vacuum, and that the nitrate of silver should be deposited in this particular line, and not go directly towards the other electrode. Why should it not penetrate the soft tissues? I have experimented a little, not with nitrate of silver, but in the use of obtundents, and have found that the objection made by Dr. Abbott was altogether out of place. As a matter of fact, if a man wants to pursue a certain line of work he always arranges the work to accommodate himself, and it is quite possible, by having one or two chairs in using cataphoresis, to make your application and go on with something else, and let your assistant do what you would otherwise be called upon to do yourself. I have my apparatus attached to the extracting chair. It has been my custom, when I propose to anæsthetize the surface of a tooth on which I am going to operate, to either allow the patient to hold the electrode or put it in the hands of an assistant, and no time should be lost in this direction; so I do not think the point as to the loss of time is well taken. The work has a permanent usefulness in our daily practice, and I do not see why it should be condemned on account of that.

Dr. Joseph Head, of Philadelphia.—In reply to Dr. Smith's inquiry why the current should not go in a direct line. The dry tooth-substance in itself is a very poor conductor, and, therefore, as the root-canal is much larger and contains much more moisture, even though it contained decayed matter, it would naturally be a better conductor for the current than the tooth substance comparatively dry.

Dr. James Truman, of Philadelphia.—The importance of nitrate of silver, to me an entirely new agent for the purpose intended, seems to require more consideration than has been given to the matter. It is true that nitrate of silver will prove a powerful antiseptic, and will prevent micro-organisms from developing; but, at the same time, we all know from the previous use of this agent that it will discolor tooth-substance. It does not require any assertion or any further experiment. It is as old as dentistry. If it be carried into the tooth through electrical osmosis, where are the limitations? Can it be controlled at the neck of the tooth? Will it be confined to the tubuli of the teeth? I think not, if we have any evidence from past experimentation. Experiments with nitrate of silver in tooth-substance have demonstrated that it does not require electric osmosis to carry it into the tubuli of the tooth. I have carried it there by simply placing a saturated solution in the root-canal, and the entire dentine has taken it up, and the tooth has become thoroughly discolored. This I demonstrated in a series of experiments that I gave to the profession over a year ago. (International Dental Journal, January, 1895.) When we recollect that we have between the so-called tubes of the teeth minor tubes, and that these run in every direction throughout the tissue, it is surprising that any one could suppose that this action could be limited. These are important matters. When a question of this kind comes up before this body it ought to be answered, because it contains within it dangerous possibilities. If it goes out from here without a protest many men will experiment with it, and teeth will become discolored. I do not see or understand how they can limit it. If we must have something to penetrate the tubes of the teeth thoroughly, to coagulate them, why not use chloride of zinc? (Applause.) We all know what that will do; it will not discolor. We found that out early in the history of the profession. Why take, then, an agent that we know will discolor and place it in a tooth in that most dangerous of all positions, the canal? We are, in my opinion, on the wrong line of experimentation when we take such an agent as this for the purpose described. I know very well from my own experience in the mouth and out of it that chloride of zinc will do the work. I would not dare to carry it in by cataphoresis, because chloride of zinc is an escharotic, and an escharotic must be handled carefully; but you can cause it to penetrate the canal by imbibition, and it will coagulate the contents of every tube in the tooth. I have carefully examined sections thus treated, and there can be no question as to the result. What does nitrate of

silver do? It is one of the best coagulants we have; but chloride of zinc is a better one by far, and you can get the same effect from oxychloride of zinc. Place it in the canal in thin mixture, and you get better results than from any agent I am familiar with.

Dr. Rhein, of New York.—The remarks of the last speaker in regard to the disadvantages and dangers of using a remedy which is so apt to discolor the dentine should undoubtedly receive our attention. I most heartily indorse the statements in regard to the superior advantages of chloride of zinc, if it is necessary to use a coagulating escharotic agent in the root-canals. My object in speaking on this subject, besides indorsing this matter, was to show the superior advantages that we can obtain in the use of the chloride of zinc through cataphoric aid. The speakers who have had no experience in therapeutic medication by cataphoresis are very apt to exaggerate the possible dangers resulting from using remedies in this manner. If a remedy is a good thing in a given case, that remedy cannot be used in too nascent a condition, and that is the effect that we obtain therapeutically when we use cataphoresis in order to drive the remedy that we are using through the substance that we desire to medicate. For this purpose we have no better agent than the ordinary pure metallic zinc. When this is introduced cataphorically we produce nascent oxychloride of zinc, and you get all the advantages of the free action of newly prepared oxychloride of zinc. We know from experience how much superior this is to the article that has remained for months after it has been manufactured. I merely want to introduce this point while advocating the superior advantages of chloride of zinc to show how much better it can accomplish its purpose if used by means of cataphoresis.

Dr. Taft, of Cincinnati.—It seems to me there is an exaggerated view taken of the matter of coloration of dentine by nitrate of silver. Why is it that coloration is produced? Nitrate of silver in solution is transparent, is a colorless fluid. When applied to dentine on the surface, or enamel on the surface, in a cavity or elsewhere, at first no coloration is observed. In a little while, however, the discoloration is seen. What takes place? The nitrate is decomposed; nitric acid is set free, and that, combined with the lime salts, is precipitated on the surface, and not in the tubuli or the canaliculi. I have never, so far as I now remember, seen a tooth stained in the canals by nitrate of silver. It is used often on the surface of dentine at the neck portions of the teeth for sensitive dentine, and is an excellent application for that purpose. Always,

unless it is at once removed, there is coloration there. That remains until it is worn off, or unless we take it off. When we take it off we find it is simply a deposit on the surface. It does not enter into the tubuli at all. It is true that the nitric acid set free from the oxide combines with the lime salts, and that decomposition takes place. That is very superficial, however. The nitric acid does not penetrate deeply into the tooth, because it very soon becomes saturated with the lime, and then it is as inert as a piece of chalk. That is accomplished very promptly,—a few minutes comparatively,—and no further action takes place. As far as this decomposition takes place the surface is roughened, and into that roughened surface the nitrate of silver may slowly penetrate; but placed upon the enamel, upon smooth, solid dentine, there is no appreciable penetration of this coloring material. If you take a little piece of chamois or a little buff wheel and polish it, it is cleared away, showing plainly that there is no penetration. I have never seen a tooth deeply stained with nitrate of silver.

I can hardly see the occasion for using the cataphoric process for the decomposition of nitrate of silver. It is decomposed in all cases. Wherever it is applied the decomposition takes place promptly. I do not conceive that the decomposition would be effected any more promptly than it will be by the simple application of the fluid to the tooth. It may hasten it a little, but not much. One gentleman spoke of the nascent condition of the nitric acid. It does not make any difference. The energy is greater upon its liberation from the silver, and I do not think the process is facilitated to an appreciable degree with the current. This matter of staining is one that I have never regarded at all as standing in the way. It may be said, and is said, and it has been demonstrated, that teeth with amalgam fillings become deeply stained. How is that? What is the method of the staining? It is simply that the vapor of mercury from the mass of amalgam, being an exceedingly subtile material, passes into the tubuli, there becomes oxidized, and so discolors the dentine as far as this discoloration takes place. It does not unite with the dentine, or any constituent of the dentine. This is not possible with the coloring material of nitrate of silver. The nitric acid, acting upon the contents of a canal, is much of the same character as the introduction of sulphuric acid, which has been discussed considerably for the cleansing out of canals and rendering them antiseptic. I do not conceive that it is much better. It may be just as good. The objection that it stains the teeth is one about which we need not worry.

Dr. James Truman.—I wish to ask Professor Taft whether he has ever made any microscopical sections when the tooth has been saturated with a nitrate of silver solution. If so, what was the result?

Dr. Taft.—I have a number of slides taken of teeth to which nitric acid has been applied, and it is just as I say,—that there is no penetration of the coloring matter into the dentine. I have not a single slide that shows any penetration into the canals of the tooth.

Dr. Fillebrown.—I simply want to say that I saw some specimens at this meeting where the dentine of the tooth was colored almost out to the cementum. I want to ask the gentleman who presented them whether they were taken after the injection or before?

Dr. Stellwagen.—I feel that everything that advances our profession is of advantage; but I have been questioning for a year past whether we are not getting into such a condition of affairs that we are complicating matters very seriously by the use of this expensive apparatus. I have no objection to cataphoresis if it be necessary; but is it necessary? I would like to ask this Association in what per cent., or in how many cases in an ordinary thousand, is it necessary. For the last year I have been using an apparatus that is so exceedingly simple that I suppose I cannot hold your attention to talk about it, and yet I have had such uniform success and so little trouble that I feel very much as if I ought to pay great respect to the little toothpick. I sharpen several dozen of the ordinary Portuguese toothpicks, made, I presume, of orange-wood, and make them to correspond to the average sizes of the different pulp-canals that I have been in the custom of treating. I then put them into a little jar with the medicament that I desire to make use of, and I keep them in this stoppered jar. Perhaps I will have two or three dozen in a strong solution of carbolic acid, with a small quantity of alcohol to keep it fluid. I have some in carbolic acid, pure crystals, melting the carbolic acid and letting the toothpick sink into it, and withdrawing the toothpick when I want to use the strong carbolic acid. Here let me say that I have found a wide difference in carbolic acids. Merck's has, in my hands, answered all the purposes which I desire. It has given me perfect satisfaction with scarcely a single exception. My method of proceeding does not differ from many others; but the toothpick, when kept in the solution, becomes very flexible, and, with a little care, can be worked up gently into almost any sort of canal. Of

course, in a bicuspid, where the two canals are united, we cannot always penetrate into the canals, but we can get as far as there seems to be a necessity for going. After washing out as thoroughly as I can, I wash out with wet toothpicks, moistened in distilled water, then dry out the canal with dry toothpicks. I may take a dozen. I place one up in the canal, work it a little, throw it away, pick up another, and so on; then I again wash out with alcohol, and do the same with chloroform if I so desire. When the canal is dry, I insert a toothpick with whatever medicament I prefer to use. One of the most successful with me is a common solution of camphor and carbolic acid. Mix them in about equal parts. If there is a little excess of camphor it is rather an advantage, because the camphor gradually evaporates from the compound. Often I will cut the toothpick off in the pulp-canal and leave it there, projecting enough to pull it out at any time I wish. I often fill immediately; and if I propose to fill the tooth with amalgam or with gutta-percha, or some temporary stopping to test it for a time, I very often leave a portion of the toothpick in the canal.

Wax as a permanent filling, I would say, has given me delightful satisfaction. It is unirritating; it will penetrate into all the delicate canals and particularly in the lower teeth, where we have so much trouble. By simply warming the ordinary dental probe, I can warm the wax in the canal until it is fluid, and in that way coax it down into the minutest portions of the canal and leave it filled, with a toothpick pushed into the wax for a temporay filling. If I want a permanent filling, I prefer to make a number of little gold toothpick shaped rolls, warm them and push them into the canal, and as I get towards the heavier or thicker part of the canal, I put in these gold points, force the wax in front of them, the surplus wax coming out around the gold. I cut off the surplus, and then I have the inside coated with wax. I have yet to find a case where the wax produced any irritation. The wax I presume will last as long as the patient, certainly as long as the tooth. In many cases I see no reason why it should not last much longer. Often in the mummy we find wax which has changed comparatively little. With the gold pressing the wax in the smaller or finer parts of the canal, we succeed in making a perfectly water-tight, air-tight, gas-tight filling.

Dr. Harlan, of Chicago.—I did not hear the first paper, and hence will not discuss it. The second paper relating to the treatment of minute root-canals with nitrate of silver directed cataphorically, I believe is the subject under discussion. From a some-

what extended experience in experimenting with teeth planted in plaster of Paris and paraffin and wax, and from some practical experience with teeth implanted in jaws, I would say that solutions of nitrate of silver do not penetrate the dentine of such teeth to any appreciable extent as to cause a discoloration which would become disfiguring. Dr. Taft made the correct statement about the decomposition of nitrate of silver, and it is only by continued force of the electric current that the decomposed nitrate of silver or oxide of silver can be driven to any extent into the dentine. The specimens that were shown here demonstrate that the oxide does not reach the cementum, because it becomes deposited so thickly that it prevents the further discoloration. I have in my possession a number of teeth that have been treated with nitrate of silver solutions, planted in plaster of Paris in 1894, but I shall open them soon and make a report on them. I have any number of teeth planted in plaster of Paris and paraffin, and wax with various kinds of oils and coagulating agents. A good many of them I have reported on at different times. Dr. Truman says that chloride of zinc will coagulate the tubes or the contents of the tubes, etc. If it does, why does it not injure the cement, if the tooth is alive? Chloride of zinc is one of those self-limiting coagulants of albumen. There have been no experiments, so far, that have proved that chloride of zinc penetrated through the dentine of a tooth. I saw Dr. Truman's experiments, and I do not think they penetrated at all. Chloride of zinc, as soon as it satisfies its affinity for water, stops; and the fear that was expressed by Professor Abbott, that the nitrate of silver would be driven through the ends of the roots, is simply imaginary, because as it is driven through the end of a root and comes in contact with the soft tissues and forms a coagulum, it will not go any farther. On the end of my finger, now, I have nitrate of silver which got there accidentally Saturday of last week. It is full strength, too. This is not a kindergarten association. The question that will be brought up by the section of Materia Medica and Therapeutics to-morrow morning will bear more on this subject, when I will have something further to say; but I want to disabuse the minds of some of you of the thought that nitrate of silver will permanently discolor the dentine of a tooth, because it does not.

Dr. Truman.—This discussion has come down to a question of veracity. Dr. Harlan absolutely said that it is impossible to carry nitrate of silver into the dentine. I say just as dogmatically that it *is* possible to carry nitrate of silver into the dentine, almost up

to the cementum. Now, which will you believe? It is a question of methods. I can substantiate what I say. He says, further, that chloride of zinc will not coagulate through the tubuli of the tooth. I know it will. Now, you can believe me or not. I have made section after section, after the treatment with chloride of zinc, and have traced it up to the peripheral distribution of the tubuli. These were not exhibited at the meeting described by Dr. Harlan for reasons then given. Those who saw the tubes exhibited know that I carried it through the most minute tubes, in spite of his assertion that coagulation could not take place beyond the mouth of any tooth. Nitrate of silver, chloride of zinc, in fact, all the agents demonstrated satisfactorily proved this. Now Dr. Harlan comes here and says it cannot be done. Let him prove to the contrary. You have simply his word, and my word, I take it, will go as far.

Dr. Rhein.—I wish to make a slight correction in the remarks I made in reference to the use of zinc in a metallic state; using the word "cataphoresis" as commonly as we do, I used it there to illustrate the decompostion of the metallic zinc into chloride of zinc. It was after I sat down that I found I should have called it "electrolysis." That is the action that takes place when the zinc is dissolved, and the oxychloride of zinc is developed in a nascent state.

Dr. Ambler.—In support of the position which the essayist has taken, I wish to present a few facts which I intended to mention in my first remarks. Nitrate of silver has been used in olden times for the prevention of further progress of superficial decay, and has been applied at the necks of teeth to prevent further erosion. In this same cataphoric process, and by the use of this same solution that has been given in the paper, by applying a very small pellet moistened with that solution to erosion at the neck of the tooth, after the rubber dam has been applied and pushed away from the cavity, apply a piece of gold that will fit the form of the tooth (you can use your platinum electrode with a small piece of cotton saturated with the solution, if you wish), you can positively stop any case of erosion at the neck of a tooth. Turn on about eight or ten volts,—some patients will bear more and some less,—turn on sufficient so the patient feels it; apply it until the tooth turns a slight shade of green. Some may have the opinion that it is necessary to leave it there until it is perfectly black; but that is not so. You simply hold your electrode there until the green shade appears, then your operation is completed. If you remove your electrode and leave that, it will turn black. You do not need to leave it fif-

teen or twenty minutes. Just so long as that black deposit remains there, if you want it there, and if the patient wants it there, of course, you will have no further erosion. In regard to the soluble electrodes of which Dr. Rhein has spoken, he did not bring out the point which I think he should have emphasized, that they should be made of chemically pure zinc and chemically pure copper, flattened, or made half-round or oval or any shape you please. If you wish to treat a pyorrhœa pocket or an abscess, you shape your wire to suit the fistula or the pocket. After the tooth has been thoroughly cleansed, the copper or zinc electrode is applied. There have been several experiments made to find something that will take the place of nitrate of silver, and that will not produce discoloration. So far, however, nothing has been found, for the reason that nothing has been discovered that will produce an insoluble compound when it unites with the constituents of the tooth, either in cases of erosion or in cavities before they are filled with amalgam, or in canals. If a putrescent pulp-canal comes into the office to be treated with nitrate of silver we do not place the nitrate of silver in it immediately. We cleanse it and the cavity, and then we are ready to operate on it with the nitrate of silver and the electrode. If the canal is damp the nitrate of silver will discolor as far as dampness extends. There have been a few cases that have been presented to those who have been using cataphoresis, where pulps have been largely exposed. Solutions of cocaine have not obtunded the pulp sufficiently, so it could be extirpated. In those cases, if you use a strong solution of nitrate of silver in two or three minutes you can destroy the life of that pulp so you can extirpate it. In a few cases where I have had teeth that had live pulps, as soon as they have been extracted from the mouth I have placed them in my apparatus for operating on teeth, splitting them open and operating on the pulp just removed from the mouth. Immediately on applying the current the pulp, in a very few seconds' time, is completely coagulated, turns almost white, and is left in a solid mass.

Dr. Taft.—Dr. Ambler says that the oxide of silver is an insoluble preparation. He ought to have said insoluble in the fluids of the mouth. That is why it remains on the teeth for days or months sometimes. That is to be borne in mind, and that is the reason it does not penetrate. The oxide of silver is not soluble in any fluid in the mouth, and it cannot pass in solid form into dentine. Anybody ought to appreciate that fact. You have the action of the nitric acid beneath that, but this remains as a protection. Dr.

Ambler speaks of this deposit arresting abrasion, that peculiar process of which we know very little. It does arrest that process while it is on the tooth, but if it is cleared away by an operation or by the friction of the teeth, the abrasion goes on. It is simply a shield from the agent that produces that wasting away, and that shows to me that it is not an agent within the tooth, as has been asserted by some.

Dr. Patterson.—While there is no one who believes more in nitrate of silver than I do, and I use it a great deal, still you must not depend upon the filling with wax, paraffin, etc., because eventually all these are penetrable by the pathogenic bacteria. We cannot and must not depend upon them, but must on an indissoluble, antiseptic root-filling material. I end, as I began, that I thoroughly believe in nitrate of silver, and I use it every day in my office; but to depend upon it for rendering antiseptic the material that has been spoken of is to make a mistake. There is one other statement that should not pass unnoticed, and that is the statement that the discoloration of a tooth from an amalgam filling was on account of the vapor of mercury. I wish to assert that that certainly cannot take place. The discoloration is on account of the pigmentation from oxides or sulphurates, but I positively assert that it is not from any vapor of mercury. Such a thing is impossible.

Subject passed. Adjourned.

(To be continued.)

AMERICAN ACADEMY OF DENTAL SCIENCE.

The regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, Wednesday evening, April 1, 1856, at six o'clock, President Andrews in the chair.

A paper was read by Henry W. Gillett, D.M.D., of Newport, R. I.; subject, "Cataphoresis."

(For Dr. Gillett's paper, see page 704.)

Also, one by Philip W. Davis, S.B.; subject, "Electricity and its Application in Dentistry."

(For Mr. Davis's paper, see page 694.)

DISCUSSION OF DR. GILLETT'S PAPER.

Dr. Allen.—I have been requested to relate my experience in the use of the "volt-selector," made by the Electro-Therapeutic

Company, of New York. Briefly stated, it seems capable of accomplishing all that is claimed for it as a means of obtunding sensitive dentine. Six weeks ago I purchased one of these instruments, and I am enabled to report favorably as to its obtunding power in a large percentage of the cases in which I have employed it. This fact alone would appear to commend its regular use in every case where the dentine is particularly sensitive, but, unfortunately, I find two serious obstacles to be overcome before it can possibly cover so large a field of usefulness: *First*, the time required to obtund the tooth ranges from twelve to thirty minutes, and often causes patient much fatigue in the process. *Secondly*, the current sometimes causes pain, even though very gradually applied, and occasionally the pain is so severe as to render its use impracticable.

Complete anæsthesia of the tooth may undoubtedly be obtained by cataphoresis, as I have demonstrated to my own satisfaction, provided sufficient time be given in the application; but as a mode of handling the many cases where an obtundent is indicated, I feel that the system has need of greater development and improvement in order to meet the needs of both the patient and the busy dentist.

Great credit is due Dr. Gillett for what he has done in bringing the subject of cataphoric anæsthesia in its present form before our profession, and should it finally develop into a system of general practice for the relief of our patients the world will owe him a debt of gratitude.

President Andrews.—I would like to call on Professor Brackett to give us an account of his experience with cataphoresis.

Dr. Brackett.—I consider it a privilege to give my testimony in regard to the efficiency of the apparatus which Dr. Gillett puts before us this evening. One of the earliest persons for whom I used it was a lady who has been my patient for more than twenty years, and who comes to me a distance of some seventy miles each year for attention to her teeth. She is the most sensitive one of two patients whom I have regularly for years permitted to take chloroform for the excavation of cavities. You all know how unbearable such work is for the occasional patient,—the few out of a thousand who seem to be totally unable to stand it. This lady's teeth are so sensitive that the attempt even to wipe out a cavity with a bit of bibulous paper literally makes her writhe in agony. The preparation of some small, simple cavities without any aid would cause her face to flush and the tears to roll down her cheeks, and the anguish was most extreme. She came to me in February for the annual fixing. She needed quite a number of fillings in a

class of cavities, many of them cervical, from which she had suffered for a score of years, and by using this method I was enabled to work for her painlessly. After the first cavities had been prepared without the pain she had been accustomed to undergo, she said, "You take my blessings to Dr. Gillett for what he has done for me."

The system, the apparatus, the scheme, does accomplish that which is claimed for it, not without effort, not without time, and not with uniform facility; that is not to be expected; but that it does obtund sensitive dentine my experience has given ample evidence.

One of the questions which I would like to ask Dr. Gillett is about the relative impress upon the dentine of different degrees of density. It has been my inference, and it seems logical to suppose it to be so, that the extremely dense dentine is less readily susceptible to the influence of the benumbing agent than is dentine of a more vascular character. I think he will give us more positive information about that a little later.

In regard to the time required to obtain this effect, I have found it is necessary to spend a longer time than that spoken of by the essayist. With me, the length of the time of application has averaged about twenty minutes. In some cases it has taken twenty-five minutes to produce the full effect, and in other cases a much shorter time. I also differ from him in using a stronger solution of cocaine. In preparing the solution, it is my habit to place a little mass of the crystals on a tile and add a little water, not very much greater than the amount of cocaine, so that I have very likely a thirty- or forty-per-cent. solution. Of course, a person making use of this apparatus should have common sense expectations, and keep in mind certain simple conditions, which must be complied with in order that the greatest success may be obtained. It is quite natural that a person of nervous, sensitive, questioning organization should be somewhat apprehensive the first time it is used, but the difficulties we meet in this way are very simple, and just such as any reasonable mind would expect. If the results under such circumstances are not just what was hoped for, due allowance must be made. The time consumed in the preparation and filling of the most excruciating cavities, including the obtunding, the process may be shorter than would have been the case had the apparatus not been used, and the patient suffers very little if any discomfort. Sometimes there are a few hurts, as in making cuts in very sensitive dentine. Concerning these, one may choose

between a second application of the current and the infliction of some suffering for a brief interval.

This does not appear to me an apparatus or a procedure to be used in every case, but for the cases of extreme sensitiveness, of which the one I first mentioned is a type, and for others not quite so severe, but in which there is unquestionably a great deal of pain in the preparation of cavities, it seems to me it is an invaluable blessing.

I feel that the work which Dr. Gillett has devoted to this, and the success which he has attained in bringing it to its present state of perfection, the pains he has taken to demonstrate practically that it will do these things, and his generosity in freely disseminating the information, should tend to bring honor to his name so long as dentistry is practised or its history is preserved.

Dr. Williams.—I have been very much gratified at listening to this paper, and I think we are indebted to Dr. Gillett for the clear manner in which he has placed this matter before us, and for the care which he has evidently taken in his investigations. The thought occurred to me that, in addition to making the application for the obtunding of pain, this method could be used for the introduction of antiseptics for saturating the roots of long devitalized teeth in order to get correct aseptic conditions. It strikes me as just the thing to make the proper application penetrate the substance of the dead root. You might use guaiacol or perhaps its carbonate, and by means of the electrical process thoroughly saturate the tubuli of the root with the antiseptic, and be reasonably sure of its being done.

Dr. Wilson.—I would like to ask Dr. Gillett if he has ever used this apparatus in Boston, and whether he found any difference between the current here and in Newport?

Dr. Gillett.—I used it at Dr. Cooke's office the other day in a clinic, but it would be impossible to make any comparative statement from that trial of it because I was paying attention to a good many different things at once. It is a fact that a current which is very irregular will be exceedingly unpleasant to any patient who is markedly sensitive to electricity; the patients will feel surges of pain as the current increases or diminishes. This irregularity may occur from different causes. You will notice it occasionally in wet and stormy weather, where the current is conducted by overhead wires.

Dr. Smith.—I would like to ask Dr. Gillett in what per cent. of cases the application has been absolutely without pain?

Dr. Gillett.—I do not know that I can answer that question accurately, because I am in the habit of pushing the application only to such a degree as the patient willingly stands. When I have tried to make the operation entirely painless, I have been successful, and I think it can be done in every case if you take time enough to do it.

If you have an assistant to make the application for you, or even give it into the hands of the patients themselves, which is a perfectly feasible thing to do, all the time desired may be taken for an application, and you can then go ahead and do the operation painlessly. If you can devise a way of taking the necessary time for the application it could be made absolutely painless in ninety-nine or perhaps one hundred per cent. of cases.

Dr. Wilson.—I wish to know if Dr. Gillett is willing to attempt to anæsthetize the teeth that we have occasionally where the pulp is not exposed, but the tooth is aching violently?

Dr. Gillett.—You mean would I have the confidence to attempt to anæsthetize the pulp in such a case? I have done so repeatedly. I doubt if it is possible to fully anæsthetize the pulp with cocaine through a thick layer of dentine, and I also doubt if it is possible to anæsthetize *every* exposed pulp. I have anæsthetized exposed pulps when they were not very vascular and not very large,—for instance, in laterals, where the exposure was comparatively large. In those cases you can feed the cocaine in rapidly enough to anæsthetize the pulp without causing much pain, and in everything except a violently inflamed pulp you may be able to remove the pulp entirely. It is my habit, however, to just benumb the surface, and then use the syringe for injecting the cocaine, as recommended by Dr. Briggs. I can do that in five minutes, while the other method takes perhaps half an hour.

Dr. Meriam.—Is it possible to anæsthetize through a crown cavity and afterwards excavate on a buccal in the same tooth?

Dr. Gillett.—I have never been able to anæsthetize one cavity through another. I think if you continued the application long enough you might eventually produce that effect by partially anæsthetizing the pulp itself. It is doubtful, however, if such long applications are desirable.

Dr. Clapp.—We should be most grateful to Dr. Gillett for putting this matter before us in a manner to be comprehended by our uninstructed minds. It has been made remarkably clear in spite of the fact that we are dealing with a science of which few of us have much knowledge. I wanted to ask him a couple of questions:

Suppose we have a cavity in which is an old filling, must it be removed or insulated before beginning the anæsthesia? I should also like to know whether this effect extends to the gum or surrounding tissues?

Dr. Gillett.—It would not extend appreciably through the tooth to the gum with the rubber in place.

Cavities that extend to the edge of fillings sometimes present difficulties. These may be surmounted in two ways. You may find that your patient is not so sensitive to the effects of the current but that he can bear the amount necessary to anæsthetize the territory desired, even if it does make connection with the filling. The objection to letting the current go through the filling is not that it does any harm to the filling, but that the patient often finds it unbearable. The other method is to cut away what you can of the filling, and then put on a little layer of varnish, gutta-percha, or other insulating material, and apply your current at the point you wish to anæsthetize. In the case of a filling that extends down to the gum, and it is exceedingly difficult to get *any* instrument down there without causing pain, it is rather hopeless to expect to use this method.

Dr. Clapp.—Will a coating of sandarac varnish be sufficient to insulate a filling?

Dr. Gillett.—I should expect it to be sufficient.

Dr. Clapp.—In regard to our irregular current here in Boston. I have noticed that my lights in the evening are exceedingly irregular. At certain times they go up and down with a very regular variation. I am inclined to think that in the daytime the current would not be so irregular, because there is less demand on the electric light company.

Dr. Gillett.—The difficulties are not from slight irregularities, but from interruptions of the current. It would be undesirable to use a source of supply where the current is interrupted or diverted almost entirely for a short time. A gradual increasing or decreasing of the current would not make so much difference.

Dr. Payne.—I would ask Dr. Gillett if there are any after-effects from this method,—that is, after the cocaine has been used by cataphoresis and the cavity filled with gold, if the tooth is hypersensitive to heat and cold?

Dr. Gillett.—So far as I have been able to judge, the after-effects do not differ from what they would be in the case of the same cavity filled without the use of electricity.

I have watched carefully myself, and have asked some of my

most intelligent patients who have had it used and know just what has been done, if they would watch the teeth where this method had been used, and I have never been able to get any evidence of effects that I could distinguish from the after-effects of fillings put in in the ordinary manner. I have found absolutely no constitutional or systemic effects.

Dr. Taft.—I would like to know what Dr. Gillett's experience has been in the treatment of sensitive cavities in children. They are among the most trying cases we have to deal with.

Dr. Gillett.—Of course, you could not use it with the younger children, because they will not keep still long enough, and the limitation is about the age when you can use the rubber dam. It can be used in approximal cavities in bicuspids and first molars, at the time when the teeth are so very sensitive,—say, between ten and thirteen. I used it in putting in a filling for a boy of twelve, who went to sleep under it the first time it was used. I knew his teeth to be very sensitive, because on previous occasions it had taken just about all his courage to allow me to prepare a cavity.

Dr. Werner.—I would like to ask Dr. Gillett in what category of success he would place the operation which was performed in Dr. Cooke's office last Thursday?

Dr. Gillett.—Fairly successful for a clinic. The result was not as satisfactory to the patient as if he had told me at the time that he felt the pain. I understand that he afterwards made the statement that it did hurt him considerably. If he had said so at the time I would have made a longer and more gradual application.

Dr. Werner.—He told me that he suffered a fair and square toothache during the whole time of the application. Do you think if you had applied it fifteen minutes longer the pain would have been less or none?

Dr. Gillett.—He might have felt a sensation, but nothing like what it would have been if the application were not made. It is an application that I have made repeatedly with the best of success in the great majority of cases where I have used it. I have tried it in the cases of nervous children who did not know that anything out of the ordinary was being done, and have operated for them without causing them pain. I have tried it with sensitive women, and there are no patients who will let you know quicker when you are hurting them than they.

Dr. Eames.—I would like to ask if it is not true, especially in the form of apparatus which is connected with the chair, if you do not have to guard against the patient unsuspectingly taking the

hand off and breaking the connection? Also, your electrode, which is applied to the cavity,—is it not necessary to guard against its removal while the current is on?

Dr. Gillett.—It will make you jump if you break the connection by moving an electrode. You will get more irritation by moving the positive electrode—the one on the tooth—than you will by moving the negative electrode. I have had very little trouble in this line,—in fact, I habitually give the negative electrode to my assistant, and I think no more about it. When I first began I found no difficulty in putting it into the hands of the patients themselves, only in such cases I took a little more pains to see that they did not get scared at something and drop the electrode.

Dr. Eames.—The reason I spoke about it is that I have used the dry chloride of silver battery for other purposes,—for instance, electrolysis,—and I have noticed that when I trust the electrode to the patient sometimes they take it off, and it gives them a little shock.

There is one more question I wish to ask the essayist,—May we not infer that a strong solution of cocaine is necessary, as you mention high percentages?

Dr. Gillett.—I have not worked with anything less than fifteen per cent. My impression is that the stronger solutions work better up to a certain point, but I think thirty per cent. strong enough.

Dr. Eames.—I wish also to remark that it seems to me that the milliampère meter ought always to be used. It is simply criminal not to use it in view of the varying degrees of resistance and susceptibility in different persons.

Dr. Gillett.—There is a difference of fully one hundred per cent., —that is to say, you may get one milliampère through a tooth with a certain force of current, while in other teeth you could get two milliampères with the same force.

Dr. Stevens.—Some one asked the question about using a larger electrode in a large cavity, and I would offer this suggestion, that you might get a larger area by placing a platinum disk on the cotton and applying the electrode to the disk.

President Andrews.—If no other members wish to speak I will ask Dr. Gillett if he will close the subject.

Dr. Gillett.—I will try and be brief in what I have to say. To Dr. Eames I would say that I have never seen any after-effects whatever from the current, so far as I have followed the matter. Dr. Marshall presented two or three years ago a very interesting paper before the American Dental Association, referring to the use

of the galvanic current to subdue irritated conditions and to stimulate sluggish conditions of the pulp. I have not followed out that line especially, and consequently have not noted such effects on the pulp. I assume that Dr. Marshall's statements are correct.

As the other gentlemen who have used the method stated, the main objection is the time consumed. I do not attempt to use it in cases where there is only a little sensitiveness to be overcome,—it isn't worth while. There are a great many cavities where some other method will be more prompt; there are a great many cavities where the patients would not be willing to have you spend the necessary amount of time for the sake of preventing the little pain they would have to endure. I have repeatedly said that it is not a method to be used in every operation about the teeth, even when you know you will have to cause pain. The typical case is where the cavities are so sensitive that to operate in them causes the most extreme pain, and all but prostrates the patient. Those cases, so far as my experience of a year has gone, can be placed under control with comparative ease. It is my hope, as I outlined in the paper, that we may be able in the future, with some other drugs, to cut down the time necessary for anæsthetizing. If guaiacol proves to be a feasible drug, the time may be reduced to one-half or two-thirds of the time required for cocaine. As I suggested, in replying to Dr. Smith's question, one of the means of solving the problem is to have an assistant who is capable of making the application, and thus save your own time, or, as I also suggested, it seems perfectly feasible for the patient to make the application for himself, —I believe that can be done.

There are some cases where it is very difficult to make the application on account of sensitiveness of the patients to the electric current.

Dr. Brackett stated that the time required in his cases was about twenty minutes to half an hour. Without counting up positively, I should say that a dozen or fifteen cases are as many as have accumulated in a year's use where I have been obliged to continue the application longer than twenty minutes, but I had a very few cases where I thought it wise to extend it to a full half-hour. One case was that of a very large crown approximal cavity, and having a previous acquaintance with the sensitiveness of the patient's teeth, I know that without the assistance of this method I could not have prepared that cavity, the patient simply could not have borne it. After a half-hour's application, I cut that cavity

all I wanted, and put in a gold filling that will stay, instead of making a cement filling needing renewal every year.

In that case it made an operation possible that was simply impossible before. In reply to Dr. Brackett's question as to dense dentine being less easily obtunded, such is a fact, and the reason is perfectly plain,—there is less animal tissue there to take up the cocaine or to conduct the current.

With regard to what Dr. Williams suggests, the penetration of roots for their disinfection,—that is one of the possible and also one of the probable uses of the method. There is also a possibility of its being of service to us in the treatment of obstinate abscesses, and its possible value for use on ulcerated surfaces in pyorrhœa alveolaris has been just touched upon in one of the published articles by Morton. There is, it seems to me, a probability of overcoming that very difficult condition of affairs where you have exposed dentine on the surfaces of molars. Now, it should be entirely feasible to anæsthetize that tissue, and then apply the actual cautery, or perhaps to drive the nitrate of silver or some other cauterizing agent directly into that hypersensitive dentine. There are numerous other uses to which it can be put, which will suggest themselves to the operator, in his daily work.

I want to reiterate that the time is the main objection, but I think that objection will eventually be overcome. At present it is not a method for every case; it is a method by which I have been able to overcome the difficulties of extremely sensitive cases, and do it in a manner which has apparently been very satisfactory to my patients and certainly so to myself.

Dr. Brackett.—Referring again to the matter of time, I will say that my most frequent use of it ranged between fifteen and twenty-five minutes, though, as I stated, there were cases where I was obliged to continue the application for half an hour.

Dr Bradley.—I think I voice the sentiments of the Academy in saying we are very much indebted to Dr. Gillett for his very excellent paper, not only for his explanation of the special uses of the milliampère meter, but for the fact that he has told us about it in such a way as to make it plain to those of us who are not acquainted with the terms used in electricity; therefore, I desire to offer a motion that we extend to him a vote of thanks for his paper this evening.

Unanimously voted.

William H. Potter, D.M.D.,
Editor American Academy Dental Science.

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The regular monthly meeting of the Odontological Society of Pennsylvania was held at 1415 Walnut Street, October 10, 1896, the President, Dr. C. N. Peirce, in the chair.

The routine business having been concluded, the subject that engaged the attention of the September meeting, that of the action of the State Society at Bellefonte, Pa., was again introduced by Dr. D. D. Smith. He began his remarks by stating: I was not present at the last meeting of this Society, and have just now learned of the action then taken in relation to the reported irregularities at the State Dental Society at its meeting in July last. The matter came to my notice on a very hot day last summer, while on the streets of Philadelphia, and it seems to have been the subject of conversation universally since that time. I do not know that its odor gets any better as the weather grows cooler.

The resolutions which were adopted by this Society in virtue of its being a part of the State Society, as recorded in your minutes fail, in my judgment, to meet the exigencies of the case. All men hearing of such irregularities, as reported to have been committed, would certainly exhibit abhorrence of them, as they have done. No professional man, I may say no man, except he be a politician, thoroughly steeped in the ways of political chicanery, could possibly approve the reports that have come to us, and I, for one, as a member of the profession, feel that a stain has been cast upon us. I do not know that I feel that my private character has sustained injury, but we are suffering as a society and profession from these reports widely circulated, and especially is this true in Philadelphia, and as this is one of the oldest and most influential societies in the State, why should it not take the initiative.

That we may place ourselves, as a Society, on record as not only abhorring such practices, but also as being ready and anxious to discern and punish them, I now offer the following resolution:

Resolved, That it is the sense of the Odontological Society of Pennsylvania, as expressed in this meeting, that a committee of three be appointed to investigate and officially report at the next regular meeting of the Society, upon the alleged irregularities in connection with the ballot taken for the two vacancies in the State Board of Examiners at the annual meeting of the Pennsylvania State Dental Society, held at Bellefonte, July, 1896.

A bare statement of the reports, it seems to me, is sufficient for the adoption of something of this nature, and will be all that is re-

quired as the action of this Society, looking to a further investigation by the proper authorities. It is said, and I presume truthfully, for I had it directly from our president, that in the official ballot for one of the gentlemen named by the council for examiner, an office which has been created by the Legislature of Pennsylvania, seven ballots only were counted, while eighteen afterwards affirmed that they cast their ballots for him. It becomes us as members of the Odontological Society of Pennsylvania to put the seal of our condemnation on all such unprofessional methods, and place the matter, if need be, into the hands of the legislature for investigation.

Dr. Fellows seconded the resolution.

The president stated the substance of the resolution, and invited discussion.

Dr. Truman.—I should like to inquire of the mover of this resolution how the information desired is to be obtained. The facts all seem to lie within the council of the State Society. Our president is a member of that body, and he should be able to give us information in regard to this. I am not in favor of appointing a committee unless that committee can act. I met one of the tellers the other day, and one whom we all respect, and it was his earnest desire that the council should investigate the matter at once. I hold this body largely responsible, for when the opportunity was in its hands for correction, at the State meeting, nothing seems to have been done. My reports are all second hand, and I may do them injustice, hence the necessity for an early and thorough investigation.

Dr. Head.—Dr. Truman believes the council condones the offence, then why does he affirm that the council should be permitted to investigate it?

Dr. Truman.—I am not opposed to this committee. I only desire information as to the course proposed to pursue to acquire the facts desired.

Dr. Boice.—The purpose of making a report is that we may have some intelligence. We are working in the dark, and every one seems afraid to talk. I was the man who raised the point that only seven instead of eighteen of the registered votes had been returned. In denouncing it, I called, "Mr. President, a privileged question! A privileged question!" But the same methods that had prevailed all through the meeting were carried to the close, and "Adjourned! adjourned!" was called, and this is why it is necessary for us to undertake the investigation.

President Peirce.—An investigation can give us an official report

of just what transpired. That much it can do. We have the resolutions condemning the action without any statement of what that action was.

Dr. D. D. Smith.—An earnest committee could accomplish much in a month and secure information upon this matter, as it is known who the gentlemen are that voted for the candidates in question. Many things now dark can be made clear, and a report can be made which will form a basis for future action if it be decided that such action is advisable.

Dr. Broomell.—I cannot understand why we, as a subordinate body, should take action for the State Society. If the charges must stand for a year I cannot see how we can act. I know the tellers are very anxious to have an investigation made, and, of course, I favor the matter if it can be carried through.

Dr. Truman.—I am of the opinion that this Society has the undoubted right to investigate. It is a matter that certainly deeply interests the dental profession in this State, and must, to a large extent, the entire States of the Union. It is not and cannot be made a mere local affair, for it involves questions that may arise in any State. The question I asked was not for the purpose of antagonizing the resolution, but to gain information as to the proposed course of procedure. If a correct history of the matter be the aim, it is well, and the report, when made, should go upon the minutes and be published in the proceedings.

The resolution was then unanimously adopted.

The president appointed Drs. D. D. Smith, Truman, and Culver as the committee.

Adjourned.

Joseph Head, M.D., D.D.S.,
Editor Odontological Society of Pennsylvania.

Editorial.

EXAMINING BOARDS AND THEIR SELECTION.

The difficulties surrounding pioneer work in any direction, whether this be in levelling the virgin forest or in opening up new avenues of thought, have been dwelt upon in themes from time immemorial. It is certainly a law of development, from the atom

to the formation of a world, that time is required to reach an approximation to perfection. This being true, criticism may be out of place where crudities are discovered in any given line of work, and it would, perhaps, be better to advise a quiet waiting for the regular processes of growth before exhibiting impatience.

While this thought should have great force in considering any subject, it should not be permitted to dominate freedom of utterance, for this, in itself, becomes a pronounced factor in progress.

With this view and with a desire to aid in arriving at a more perfected standard in the selection of members of State boards, discussion is not only profitable, but the only method to improve upon the crudities very apparent in the laws at present in force in the several States for the government of the practice of dentistry.

The departure from the old plan of unlimited freedom of practice has been along a somewhat thorny path. It could not have been expected that the American spirit, naturally antagonistic to the enslavement of law, would take kindly to legislative interference. This opposition has not been confined to a class always resistant to law, but is found largely among those who have had most to do with the training of young men for the profession. The reason for this opposition is readily explained. It has not arisen from opposition to legislative enactments so much as to the fact that educators felt that the laws, as prepared in the earlier periods, were framed by men with, no doubt, excellent motives, but lacking that experience in the needs of student life that can only be acquired by long training. The result was that almost every State law has been amended in repeated sessions of legislatures to an extent that very few, even in the State in which they are domiciled, can tell exactly what the law requires. This is an exceedingly unpleasant state of affairs and has led to misunderstandings and open conflict with State boards.

It is time some action was being taken looking not so much to a modification of the laws of the several States as to the more perfect systematizing of these, and a unification of the statutes so that uniformity of action will prevail. It is in the last degree an absurdity that a nation claiming a central power controlling all its members, that any one or all of these should be permitted to enact laws antagonizing every other member of the Confederacy, and yet this is exactly what has been done in the past and is being done in the present. A graduate to-day, in most cases, cannot cross over the border of an adjoining State and practise on his diploma, although

that diploma may have received the highest indorsment of his school and the Board of Examiners of his State.

The origin of this State antagonism has had its inception in pure selfishness, a desire to bar out and make it almost impossible to practise except within prescribed boundaries.

That these enactments are contrary to the Constitution of the United States must be clear to every intelligent reader of that document. That this is the legal view is evident from the formation of the Interstate Commission to prevent discrimination in traffic between States.

A diploma from a recognized school of dental instruction, fortified by a re-examination of the State boards, should be admissible in any State of this Union, and the time has arrived when some effort must be made to effect this desirable object.

The question has been discussed for a sufficient period, and it is to be regretted that the wise suggestions of President Crawford at the last meeting of the American Dental Association met with no adequate response from those in authority.

These suggestions should form a basis of action and the initiative might very properly be taken by the National Association of Examiners. The following are the salient points in Dr. Crawford's address:

"*First.* I will say that any enactment placed upon the statute books of our common country, or any of the independent States of our common country, should rest upon the immutable principle of equal justice to all and exclusive privileges to none.

"*Secondly.* All laws that are intended to control the conduct of an individual or individuals in regard to any definite and universally uniform question in all the States should be absolutely the same in all particulars.

"*Thirdly.* All such laws should be plain and simple in their construction that the humblest citizen could comprehend them, and, if necessary, administer the same. . . .

"*Fourthly.* The penal feature should be so well marked and imperative that none would dare disregard, only at their peril. . . .

"*Fifthly.* Each State should have the same enactments controlling the matter of dental education, making the requirements for graduation uniform in every particular, thus holding dental colleges up to a higher and better standard.

"*Sixthly.* The first registration of an individual to practise should be made within twelve months after receiving a diploma from a regular dental institution of learning. The second or sub-

sequent registrations in any other State of the Union should depend upon the presentation of a certificate from the State Board of Dental Examiners that the individual held a diploma from a reputable dental college."

To carry out these views the president suggested the appointment of a committee to consist of one member from each State appointed by the American Dental Association, National Association of Dental Examiners, and the National Association of Dental Faculties, "to be known as a general legislative committee, whose duty it shall be to formulate and draft such a uniform law as could not fail to be satisfactory to all the States."

These suggestions are specially called to the attention of the dental profession as a method of extrication from the present discreditable tangle of legislative enactments which have become a serious burden.

No reason exists why the National Association of Dental Examiners should not ask for the appointment of a national committee, as recommended, and it would seem that this might very properly be done by any national organization. A year must elapse before these can meet, and in the mean time the matter should be thoroughly canvassed in that that this exceedingly incongruous state of affairs may be changed.

In this connection the methods adopted in the appointment of members of State examining boards should be considered. In a former article these methods were criticised as unworthy an educated body, but no change has been made, nor are we aware that any effort at reform, in this direction, has been attempted. Politics governs with the same powerful influence as heretofore. The governor in some of the States still appoints whom he pleases, irrespective of ability, and in others the State society presumably sends up its best men to receive the endorsement of that functionary. This latter method would seem to be the proper channel through which these appointments should come, but, unfortunately, from recent experiences, this has its objections, and it is very evident that some other method of forming State boards must be devised if these are to continue to hold the respect of the dental profession, for, as at present constituted, the entire system is in danger of sinking into deserved contempt.

The colleges of the country have borne much in this direction, in the hope that the time would come when the evils of the present crude system would be eliminated, but instead of improvement there seems to be a decided change for the worse, and these insti-

tutions find themselves in a maze of difficulty, from which extrication seems impossible except through radical measures.

The recent proceedings of the Pennsylvania State Society, so severely criticised in our last number by the Odontological Society of Pennsylvania, is but another evidence that even State associations are not to be depended upon in this matter. The action taken there deserves and should receive the severest condemnation, and it must remain a surprise to the profession in Pennsylvania that the council of the State society has permitted months to elapse without, as far as we are aware, any attempt at investigation. It is not sufficient that the gentlemen elected to fill the vacancies upon the State board, and who are above reproach, should have resigned, the demand being for light upon the entire disagreeable subject. If the fell spirit of caucus and intrigue can invade a State organization, then all confidence in the present plan of forming State boards must be shattered.

It would seem from the distracted condition of professional legislation in this country that nothing short of an entire change of front in relation to it will be of any avail. The measures to meet this in our complicated system of government may not be clear or devoid of difficulties to any single mind, but it is hoped that out of the present confusion there may arise an intelligent arrangement whereby something more satisfactory than the present methods can be devised. While these are continued there will be constant inharmony and antagonisms of a serious character. To obviate this there must be a unification of the laws, and those selected to enforce these must be above reproach, and, further, all appointments must be removed from political influences.

DR. WILLIAMS'S RETORT.

In the October number of the *Dental Cosmos*, Dr. J. Leon Williams, of London, devotes three pages of solid matter to the editor of this journal. The fact that so much time and space has been taken must be regarded as complimentary, although, in our opinion, it might have been used for a better purpose.

That the editor of the *Dental Cosmos* does not agree with this view is apparent, for he takes occasion to say, by way of preface, that "in the interest of justice and right, matters of this character are entitled to immediate publication." We are pleased to learn,

and, doubtless, the dental profession will be equally delighted to note, that the editor has adopted a broad and liberal policy for the *Dental Cosmos*, for he says, alluding to the article of Dr. Williams, "It is merely an expression of the general policy of the journal to afford opportunity for a fair hearing of all sides of a question of this character." In fact, the editor of the *Dental Cosmos* was so much impressed with its importance that he adopted the unusual course of placing it upon the editorial pages, and states that this was done "because it was received after that part of the *Dental Cosmos* devoted to 'Correspondence' had been printed." The curious reader on turning over the pages will look in vain for the part "devoted to correspondence."

It is quite evident that Dr. Williams found a club to use on Heintzmann, Bödecker, and Abbott, when he originally assumed to criticise the National Association of Dental Faculties, and now he proposes to himself to make of the editor of this journal a similar club, and for the same purpose. We do not intend to be thus used.

In the first place, we can state to Dr. Williams that this journal does not constitute itself the defender of the action of the Association of Faculties, nor the trinity of investigators mentioned. The editor would not arrogate to himself the position of a court to decide disputed questions in histology, and while he is personally not in full accord with the histological views held by Bödecker, Heintzmann, and Abbott, he would deem himself unworthy of a place in a liberal profession if he refused to give to these views, and all others, due consideration, nor would he lower his self-respect by descending to the murky region of abuse.

When Dr. Williams asserts that the editorial in the INTERNATIONAL DENTAL JOURNAL meant to convey the impression that the Association of Faculties was above criticism he distorts the truth. He changes the real statement made in his first paragraph, and adds an additional line in which he seeks to impute motives not held, and then in the second paragraph he states that the editor of the JOURNAL "is not speaking for the entire board of the National Association of Dental Faculties *when he intimates that they are above and beyond criticism.*" (Italics ours.) At no time has the editor ever sought to speak for that association, but what he did say, August, 1896, was, "The position held by the National Association of Dental Faculties is a dignified and proper one, and is not likely to be changed by any criticism, come from what quarter it may."

Here is another of his statements: "Now, what are the facts

about this matter. It seems to me that the editor of the INTERNATIONAL DENTAL JOURNAL has done his best to conceal by a *most equivocal* and disingenuous statement." Conceal what? It is a new sensation to the writer to be accused of equivocation, the twin sister of lying. The statement we made was an open one as an editor and as a member of the Association of Faculties. We stated in the editorial that "the Association of Faculties had nothing directly to do with the teachings of Dr. Williams, Dr. Bödecker, or Dr. Abbott, but leaves the matter to the judgment of its individual members." That may be equivocal, but if so, the word has a different meaning in England from that usually given it in America.

Here is another of his reliable quotations: "The next statement which the editor of the INTERNATIONAL DENTAL JOURNAL would, if accepted, place the board [what board?] in a still more unenviable position. The indorsement, he says, simply means that an author has published a book *worthy of men engaged in teaching.*" (Italics ours.) What the editorial in question did say was this: "The recommendation [of the Association of Faculties] does not go so far as to even suggest that any work so recommended shall be used as a text-book in the colleges, although that word has been used, but it simply means that an author has published a book worthy of *consideration* by men engaged in teaching, and does not carry any force beyond that statement." His leaving out the word *consideration*, to say nothing of the explanatory matter, leads to a marked difference in the sense of the sentence. This may have been an unintentional omission, and we are disposed to give Dr. Williams the benefit of the doubt.

We shall make one more quotation and then rest, for it would be a useless expenditure of strength to follow his methods of distorting statements: "Dr. Bödecker says the National Association of Dental Faculties has adopted his book as a text-book for students. His statement has not been officially denied, but the editor of the INTERNATIONAL DENTAL JOURNAL takes it upon himself to say that it has not only *not* been adopted, but that the board has not even suggested that it be so used." We do not choose to make use of the proper word to characterize this, but refer our readers to the editorial, where not a word will be found to give color to such a statement.

We have not the space or the disposition to follow Dr. Williams through his long arraignment. We are not particularly disturbed by it, but it may be suggested that in our opinion it is not in good taste for a dweller on English soil, for all the good that may be

there ingathered, to criticise an association with which he can have but a remote interest. If he chooses to attack Bödecker's book from his foreign stand-point he should do it fairly or omit it altogether. This journal is not the apologist of any author or of any aggregation of men, but if anything is to be said we propose to use words without reserve, and which will be understood. It is not its purpose either to permit men to be called fools by quoting a possibly mythical "eminent teacher in Germany," who is made to say "Messrs. Heintzmann and Bödecker have made immortal fools of themselves in several treatises."

The writer of this makes no claim to a knowledge of general or special histology equal to that possessed by Dr. Williams, but the little that has been absorbed was sufficient to interest him in every line of Dr. Williams's recent work, and to appreciate it as it deserves, as a most valuable, if not the most valuable contribution made upon the subjects treated in the past decade. This, however, does not mean indorsement of all his views. With this liberal spirit all things should be met, and any other course is to the intelligent reasoner unprofessional.

We leave Dr. Williams here, and do not expect to recur to the subject again. He can fight his windmills through the pages of the *Dental Cosmos*, if so disposed, but we have no disposition to take part in any such controversy.

Bibliography.

The American Text-Book of Prosthetic Dentistry in Contributions by Eminent Authorities. Edited by Charles J. Essig, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy, Department of Dentistry, University of Pennsylvania, Philadelphia. Illustrated with Nine Hundred and Eighty-three Engravings. Philadelphia and New York : Lea Brothers & Co., publishers, 1896.

The profession of dentistry in the United States has waited long and with some impatience for the appearance of a work worthy to be called a text-book upon the principles and practice of prosthetic dentistry, and at last it comes to us, not the labor of one man

but of eight, with the guiding hand of an editor thoroughly trained, as must certainly be manifested throughout its pages.

The editor says in his preface. "There is contained in the body of the present volume the material which a consensus of opinion declares the best that dental prosthetic art has evolved." That this is true must be conceded by every careful and competent reader of the book.

The contributors have been selected for their recognized ability, and, apparently, for geographical distribution, as only three, including the editor, hail from Philadelphia, and the balance from the Middle States and far West. This must be recognized as a wise arrangement, and bars criticism in advance on the ground of local narrowness.

The work opens by a description of the "Mechanical Laboratory; its Equipment and Arrangement," by the editor, Dr. Charles J. Essig. This covers seventy-three pages, and is profusely illustrated, and will be invaluable to the beginner desirous of having a properly-appointed laboratory.

The succeeding chapter, on "Metals and Alloys used in Prosthetic Dentistry," by the editor, Dr. Essig, is, in the opinion of the writer, one of the most valuable contributions in the volume. While it does not include all of metallurgy, it does meet all the wants of the practitioner, and in the clearest manner explains processes so that the student should have a conception of the metals in daily use and the proper methods of treating them.

The next chapter, by Dr. C. L. Goddard, of San Francisco, seems to the reviewer to be very inappropriately named "Principles of Metal Work." The entire chapter is taken up with the preparation of appliances for regulating teeth. This does not detract in the least from its value, for it gives clear and satisfactory explanations of how these should be made, a very important matter not only to the student but to the advanced practitioner, who is often at a loss how to prepare apparatus for special cases. This chapter is also profusely illustrated in the main with artistic engravings. Throughout the book the careful reader will notice that in the illustrations, evidently prepared for the book, there is a close following of the natural forms of the teeth, these being, as a rule, very perfectly and beautifully drawn, and very satisfactory to the critical professional mind.

The chapter on "Moulding and Carving Porcelain Teeth," by Dr. Essig, is upon a subject of vital interest, and it is of special gratification that this has been prepared by one thoroughly conver-

sant with it in its past history and practice. There is the ever-present danger of this being a lost art, as far as the study of dentistry is concerned. In the opinion of the writer, and one long entertained, this study should be made part of the curriculum of all colleges, for it certainly is the basis of all prosthetic work. It is observed with special gratification that the editor gives prominence to two skilled workers in this branch of prosthetic art, the late Professor Elias Wildman and W. R. Hall. The former failed to receive during his lifetime the full meed of praise due him, but for his efforts the manufacture of porcelain teeth would probably have remained as it was left by Stockton. His teeth have never been improved upon, and, indeed, it may be doubtful whether the perfection to which he attained has been continued by others. He prepared the first gum enamel worthy of consideration, and this, together with his formulæ for bodies, has never been improved upon.

The reader will find in this chapter very fully illustrated descriptions of the entire process of manufacturing teeth from the single plain to the gum tooth, and from the single gum to the block; the methods of carving teeth by hand; the different furnaces used; in fact, everything in relation to ceramic art as applied to the manufacture of teeth.

The article that follows on the "Preparation of the Mouth" is by Dr. H. H. Burchard. This chapter will probably meet with some criticism, not that it is out of the line of general practice, but that it will come in conflict with experience at many points. It impresses one with the difference that must ever exist between the laboratory and the office. An illustration of this is to be found in the author's idea of hyperæmia caused by the wearing of rubber plates. "Deposits of food-*débris* being permitted to remain upon the plate undergo fermentative and putrefactive decomposition, the products of which act as irritants. . . . Instances are seen where the wearing of a vulcanite plate, no matter how carefully finished or cleansed, is attended by hyperæmia of the underlying tissues." This the author ascribes "to lack of conductivity of the base." It is questionable whether this pathological condition is ever produced, where antiseptics are in daily use. The cause of this hyperæmia was demonstrated by Black to exist in the development of micro-organisms, and the old idea of mercurial action was exploded twenty-five years ago through the experimental work of Wildman, Buckingham, and Truman.

On page 276, on "Type of Denture," there seems to be more needed in relation to a peculiarly difficult class of mouths, where

the author describes the "presence of tuberosities which cover the median line of the vault." In a paragraph in another article he attempts some explanation, but it is not very clear. A "horseshoe chamber" will not meet this difficulty, and, in the opinion of the writer, no impression was ever made by plaster from which a perfectly fitting plate could be made under this condition in the mouth. Every mouth of the kind requires hand manipulation with the plaster model, adding here and removing there. When this is properly done, a vacuum chamber will not be required.

"Taking Impressions of the Mouth," by the same author, is satisfactory and must be useful in suggestions.

The "Making of Models and their Preparation," by the same, is a very excellent and practical article, the illustrations, combined with the text, should render every operation clear to the student, showing the practical hand in every line.

"Dies, Counter-Dies, and Moulding," by the same writer, covers the entire ground of the work, and what has been said of the last chapter will be found true of this, and in this may also be included Chapter IX., on "Swaged Metallic Plates."

"The Bite or Occlusion" is the tenth chapter, and was given to Dr. Grant Molyneaux, and his work has been excellently done. He very wisely, in the reviewer's opinion, has incorporated Dr. W. G. A. Bonwill's method of articulation. For over twenty years this untiring inventor has labored to convince a careless dental world that the old methods of articulation were wrong in principle and worse in practice. It is simply amazing that his articulator has not even yet come into general use. Dr. Molyneaux has, it is thought, fairly given, in very full quotations from writings of Dr. Bonwill, his methods and theories, but it seems to the reviewer that, in all fairness, Dr. Bonwill should have had the privilege, in a work of this character, of presenting his own methods in his own way.

It will be impossible to follow up all the chapters, for the interested reader will understand that this review has not touched, except very lightly, on half of the seven hundred and fifty-one pages composing the book.

"Selecting and Fitting the Teeth" is a chapter of great practical value, and, did space permit, the rules formulated by Dr. Burchard for soldering would be repeated here. They should be placed in every college laboratory in letters large enough to be read daily by every student. No process in prosthetic dentistry is more difficult to understand than this, and comparatively few excel in it.

The chapter on "English Tube Teeth," by Dr. Essig, is one that

has been greatly needed, for the ignorance regarding these valuable teeth on this side of the Atlantic is remarkable, but easily understood, as it has not been in the interest of manufacturers of porcelain teeth to make these aids to practice better known.

"Continuous Gum Dentures," by Dr. Ambler Tees, recalls to mind the valuable services rendered by the father in this direction, and the son has amply demonstrated his ability in this line of work. This was to be expected after the many years spent as demonstrator of "continuous gum,"at the Dental Department of the University of Pennsylvania. To those at all familiar with working porcelain bodies and enamels these pages will be quite sufficient, but to those who have not been thus favored, the writer would advise practical instruction before attempting the insertion of this form of denture.

"Cast Dentures of Aluminum and Fusible Alloys," by Dr. C. L. Goddard, follows, and is a clear exposition of this part of the subject-matter.

"Vulcanized Rubber as a Base," by Dr. Essig, is a very interesting chapter and fully illustrated. It covers the entire subject, including the preparation of interdental splints, an important matter to the isolated practitioner.

"Celluloid and Zylonite" was given to Dr. W. W. Evans, whose rare ability in working these materials has long been recognized. The entire process is satisfactorily elucidated.

Dr. Alton Howard Thompson, of Kansas, discusses the "Temperaments," in Chapter XVII. This is a valuable contribution from the scientific and artistic side of the mechanical question, and the tables will, doubtless, often be referred to by those desirous of excelling, but it is expected the matter will be more highly appreciated in the next century than it will be in this by the average dentist. The standard of mental training has not, as yet, reached this, to the reviewer, very essential part of prosthetic dentistry.

In the chapter on the preparation of "Artificial Crowns," by Dr. Burchard, there will be found some erroneous teaching. "The pain following arsenical application is caused, in great part, by the pressure of the retaining filling-material." The action of arsenic is primarily to produce violent inflammation, and the pain is the result of this. If inflammation be present from prior pathological conditions, pain will be increased. Pressure has something to do with pain, but only in a limited degree. This, however, on the whole, is a valuable chapter, as is also that of the succeeding one on "Bridge-Work," by the same author.

"The Hygienic Relations and Care of Artificial Dentures," by

Dr. Essig, has not been a subject of special thought in works of this character, but is of very great importance, and it is a pleasure to allude to it as being part of the book.

The closing chapter on "Palatal Mechanism," by Dr. Rodrigues Ottolengui, is a fitting ending of this able production. The long and intimate relations existing between Dr. Kingsley and Dr. Ottolengui make this chapter of special value, as it covers the experience of two very able workers in this direction. It, in common with all the chapters, is properly illustrated. The fact that nine hundred and eighty-three illustrations are given in the book, and many of these of the most elaborate character, will furnish an idea of the expense attending its preparation; in fact, the publishers have spared nothing to make the work worthy the dental profession.

The writer of this review has gone over this book page by page, making this article of exceptional length. No other course could be adopted with a work of its importance. The errors, in his judgment, are but few, but, doubtless, many will take exceptions to many of the processes. There are occasionally blemishes, here and there, more in a lack of good taste than actual errors. It has been noticed that one writer frequently makes use of the French word *bête noire*, instead of using the plain but more effective English equivalent. Plain things need plain words to explain them, otherwise obscurity results and comprehension is rendered difficult.

The reviewer feels that the tendency of this book will be to raise the standard of mechanical dentistry, not merely in name, but in fact. It has too long been relegated to obscurity, and, in many instances, it has been regarded with contemptuous indifference. No one can fail to rise from the reading of the pages here presented without a feeling of increased respect for the basis of his profession, prosthetic dentistry, without which the scientific part would be as a sculptured figure without its pedestal.

The reviewer will be greatly disappointed if this book does not become the standard text-book in all colleges of the English-speaking world, for it is his decided opinion that no more thorough production will be found either in this country or in any country where dentistry is understood as a part of civilization.

The publishers deserve great credit for their liberality in placing this book upon the market. The work accomplished by this firm, in introducing the most valuable as well as the most expensive books on dentistry, should not be overlooked. Their "American System of Dentistry" was regarded, at the time of its issue, as a

risk not likely to be repeated, and yet we understand a second edition of this is in preparation, as well as a companion to this just reviewed, a work on operative dentistry.

Obituary.

DR. EDWIN A. STEBBINS.

Dr. Edwin A. Stebbins died at Shelburne Falls, Mass., on September 26, 1896. He had been ill with an incurable disease for over a year. Dr. Stebbins was born in Brookline, Windham County, Vt., July 10, 1837. He was reared on a farm and educated in the public as well as other schools, and became a teacher subsequently of ornamental penmanship in the Wesleyan Academy, Springfield, Vt.

He began the study of dentistry at Benson, Vt., and opened his first dental office at South Londonderry, Vt., in 1860. In 1862 he enlisted in Company G, Eleventh Regiment, Vermont Volunteers, and served until the close of the war. He was commissioned first lieutenant after having spent some time as quartermaster-sergeant. In the spring of 1864 he was ordered to the front and placed in the Sixth Corps. The regiment was with Sheridan in his expedition up the Shenandoah Valley, was in front of Petersburg in 1864–65, and took part in the final assault upon Lee.

At the close of the war he resumed practice first at West Townshend, Vt., and finally settled at Shelburne Falls in 1869.

Dr. Stebbins came prominently before the dental profession through his work with nitrate of silver upon children's teeth. This had been so thoroughly and so carefully performed that it at once attracted wide attention, and, although some efforts were made to minimize this in certain quarters, they were not successful, and Dr. Stebbins was given due credit for original and successful investigations.

It was through this effort that the writer became first acquainted with him, and learned to appreciate his character as one of the most painstaking and earnest men in the profession, but at the same time entirely free from self-assertion. Those who were in attendance at the American Dental Association, at Saratoga, where,

upon motion of the writer of this, Dr. Stebbins was granted the special privilege of detailing this process, will recall the deep impression his careful statements and scientific method made upon the interested auditors. It is not remarkable, therefore, that his experiments with nitrate of silver, in the direction described, were subsequently amply confirmed in practice.

He was an active worker in the church and Sunday-schools, and was also an earnest temperance advocate, taking an active interest in the Prohibition Party in his State. He was also interested in Masonry.

He was active in school work and served for many years as one of the trustees of Arms' Academy.

In the death of Dr. Stebbins the profession of dentistry has lost, in the language of one of his colleagues, "one of its truest members." The silent reaper spares neither high nor low, but while the departure of a noble man from the ranks must be a cause of painful regret, the consolation remains, to his family and his profession, that his work in life stands as the truest and best monument to his honor.

Current News.

PHILADELPHIA COUNTY DENTAL SOCIETY.

At a meeting of the Philadelphia County Dental Society, held October 17, 1896, the following resolutions were adopted:

WHEREAS, The Pennsylvania State Dental Society is a delegated body, made up from representatives of local societies in the State; and,

WHEREAS, The Philadelphia County Dental Society is one of these representatives, and it therefore becomes the Society's privilege and duty to take part in all that concerns the welfare of the Pennsylvania State Dental Society; and,

WHEREAS, At the meeting held at Bellefonte, Pa., July 7, 8, and 9, 1896, a crime was committed that, if allowed to pass unrepudiated, will, in the future, place a stain upon the name of dentistry in Pennsylvania; therefore, be it

Resolved, That this Society strongly denounces such proceedings, and urges that the guilty be punished.

Selections.

THE VALUE OF ANTIPYRETICS.

Binz, of Bonn, discussed the relative value of quinine, salicylic acid, antipyrin, antifebrin, phenacetin, thallin, and alcohol. He stated that until 1867 quinine had universally passed as a drug acting in malaria through its effect on the nervous system. His researches at that time had demonstrated, however, that it was a powerful poison for protoplasm of a lower order, and especially that produced in media in which decomposition of vegetable substances takes place. His experiments had also demonstrated that the antipyretic action of quinine was generally independent of the nervous centres and the circulation, and that the drug exercised a paralyzant action on an inferior organism which was the cause of malarial fever. The discovery of Laveran and the researches of his successors have since shown the exactitude of these assertions. The lowering of febrile temperature in other diseases, as well as in healthy, warm-blooded animals, is due to the fact that the activity of the disassimilating cells is directly affected. This fact is demonstrated by experimental evidence (1) that quinine diminishes the number and vitality of the leucocytes; (2) that it diminishes the quantity of nitrogen and sulphur in the urine of warm-blooded animals, whether healthy or suffering from fever; (3) that it lowers their internal temperature when they are submitted to the action of a hot vapor-bath; (4) that in Rubner's calorimeter (which enables one to study the subject of the experiment and the control animal at the same time, and find absolutely similar conditions) under the influence of quinine there is a decreased production of vapor in warm-blooded animals, whether healthy or febrile. Quinine is an antipyretic through the influence which it exercises both on the pathogenic cells which cause malaria and on the cells which form a normal portion of the organism. It has thus a special as well as a general antipyretic influence.—*University Medical Journal.*

THE

International Dental Journal.

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Original Communications.[1]

THE RÖNTGEN RAY.[2]

BY WILLIAM LINCOLN SMITH.[3]

I shall probably have comparatively little to say in the course of my talk which has not appeared in one form or another in some of the technical journals or some portions of the daily press. Nevertheless, there has been a great deal of misunderstanding on the subject, and conflicting and contradictory reports have arisen, simply on account of the enthusiasm of the reporters, especially of that portion of the press which reaches that class of people who at present take no particular interest in this matter. In order that the subject may be clear, it seems well to go back a little that we may see how the Röntgen rays are related to some of the phenomena of electrical science.

Of course, the easiest form in which to illustrate the character of the electric spark is the common discharge between the poles of a static or influence machine, the apparatus which we use to explain the phenomenon of the lightning flash. Now, when that discharge

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[1] The editor and publishers are not responsible for the views of authors of papers published in this department, nor for any claim to novelty, or otherwise, that may be made by them. No papers will be received for this department that have appeared in any other journal published in the country.

[2] A talk before the Harvard Odontological Society, May 28, 1896.

[3] Instructor in Electrical Engineering, Massachusetts Institute of Technology.

is allowed to pass from one pole to the other, the discharge is apparently the same in all its length; and as carefully as you may examine the terminals from which the discharge is passed, you will see no difference whatever between them, but if we make the experiment in perfect darkness and take a series of such photographs as those by Trouvellot, we shall find that there is a very distinct and characteristic difference between the two, according to which pole the discharge was derived from. This difference, of course, is very hard to define, and it is only by the aid of photographs that we are enabled to see that there is some difference there. Now, this discharge can be deflected, as you might expect, by passing the poles of a magnet near to it,—that is, the discharge sags under the pole of the magnet; but after it has dropped it returns to its original path, —it is only a momentary sag; there is no permanent deflection of the discharge by the action of the magnet.

Now, suppose we begin to send this discharge through atmosphere at a diminished pressure, in other words, through a greater or less vacuum. We shall find that the discharge has at first its ordinary thread-like form. As we increase the vacuum, we notice a difference in the appearance of the spark,—it begins to broaden; it will get "fatter," you might say, but at the same time that it increases in its diameter it will become fainter,—that is to say, it begins to approach more nearly to the form of a glow extending through the tube, but the light becomes paler, and finally we shall reach a point where we get what we might call billows of light, which run along from one terminal to the other. This is very characteristic of the electrical apparatus known as the Geissler tubes. The bands of light begin quite narrow and gradually change, and they become broader or narrower as you increase or diminish the vacuum. The point of interest does not lie in that breaking up of the discharge, but in the difference which begins to appear between the two poles. We will suppose that the discharge is made from the anode (which is the name given to the positive pole of an electrical battery or apparatus), and passes across the tube to the cathode (or the negative pole). We shall notice that one pole has a very brilliant, star-like effect at the very tip of the pole, which is usually made of some material suitable to the passage of electricity, we will say of aluminum wire, which is quite commonly used, and the size of it is, well, one-thirty-second of an inch in diameter; then at the very tip of that wire there would be a very brilliant, star-like point, from which a beautiful effect is derived. At the other pole we find the discharge is distributed more evenly over

the whole surface of the wire; moreover, it does not appear to touch the wire. On close examination we shall find that there will be a very small space which is absolutely dark. It shows in the midst of the glow around the pole almost an inky blackness; there is absolutely nothing there that we can discover by the use of photography or any known method. It is right here that the subject begins to get interesting, for we find that the higher we increase the vacuum, the larger does that dark space become, and it is possible to obtain that dark space large enough to fill the whole tube in some cases. If you could obtain a complete vacuum, it would do so, but the tubes most commonly in use have about one-millionth of an atmosphere remaining (an atmosphere meaning fifteen pounds pressure), which is almost as low as it is possible to force the vacuum at present. Now, when we get that dark space expanded enough so as to include both the terminals, the tube becomes apparently impervious to the electric spark. It takes more power than we can derive from experimental machines to produce the results we desire, and we therefore have to use some more extensive apparatus for the generation of the necessary current, and to illustrate the effect of the vacuum on the electric current an apparatus has been devised which is so arranged that both poles are situated in the vacuum-tube within half an inch from each other; then the two electrodes are connected with a spiral tubing at points just before they enter the vacuum-tube, and the path around through that spiral tubing from one electrode to the other is something like two and one-half yards, while the distance across is only about half an inch. Now, it is well known that electricity in its passage from one point to another will take the path of least resistance; nevertheless, the discharge will pass every time through that tubing rather than pass from pole to pole in the vacuum-tube, simply because both terminals have their tips in the dark space.

When we have a vacuum-tube which shows quite a large dark space,—has a vacuum somewhere within one to two-millionths of an atmosphere pressure,—we have what is called a "Crookes tube," simply because Professor Crookes, of England, was prominently connected with the investigation of the high vacua phenomena; nevertheless, Hittorf, in Germany, was the first to study the peculiarities of the electric current in high vacua. Now, Professor Crookes found that there were many phenomena exhibited by the electric current in vacua that were not shown when the passage took place in the open air. First, he found that he had got rid entirely of all the effects that proceeded from the anode; secondly,

the dark space around the cathode was enormously extended; and, thirdly, what we call the cathode rays were produced,—that is, when the discharge was allowed to pass from anode to cathode, apparently there were produced at the cathode another set of rays which travelled outward and passed in straight lines, and once deflected by the magnet did not return to their original path.

We shall see that there are a number of interesting phenomena produced by these cathode rays. For instance, if you interpose in the path of the rays a screen made of aluminum or platinum film, that film promptly casts its shadows on the wall of the tube; the cathode rays cause the interposed metal to glow with a brilliant light, which is called "luminescence;" it used to be called "fluorescence," but "luminescence" seems now to be the more scientific term for it. A great many substances are found to be luminescent to the cathode rays: most of the metals, aluminum, platinum, gold, silver, platino-barium cyanide; tungstate of calcium; a great many of the precious stones, diamonds, rubies, and emeralds, and these precious stones generally glow with most beautiful color; German glass glows with a bright apple-green. If, then, you place a film of any of the substances I have mentioned in between the source of the cathode rays and the wall of the tube, it will cause the substance to glow, and it will cast but little shadow on the wall of the tube; but, if you place a piece of mica or quartz in the same position, you will find that it will not light up so brilliantly, and that it will cast quite a dense shadow on the wall of the tube, showing that substances which are optically transparent are not necessarily so to the cathode rays. The explanation offered for this anomaly is that the cathode rays are not rays, as we understand the term when applied to rays of light, but a steady stream of molecules being carried along by the electric flow, since the vacuum is so high that what is called the "mean free path" for the molecules is sufficiently great to allow them to move clear across and strike against the wall of the tube, this wall thus being made luminescent by the steady molecular bombardment. That would seem to be rather a good explanation, because it is possible to make a toy wheel go round rapidly by the passage of the electric current through a vacuum tube, and it would seem as though the successive paddles were struck by this stream of molecules, causing it to revolve. Nevertheless, this theory was not received with great interest in Germany; it was the more common belief there that the cathode rays were some disturbance in the luminiferous ether,—they were not a bombardment of the molecules against the wall of the tube,—so that physicists there made many

investigations and experiments in the endeavor to prove whether they were a molecular bombardment or not. Professor Hertz took up the subject (the same who enabled us finally, a few years ago, to measure the length of an electrical wave in space) and studied it quite carefully. He found that some substances put inside the Crookes tube were transparent to these rays and some were not, and, among other things, he found that certain metal films were transparent, provided you got them thin enough; that these rays would pass through certain thicknesses of gold, silver, copper, or platinum, yet they would not go through the same thickness of mica. Just when he reached this point he was led off from this line of investigation, and before he could take it up again he died. His assistant, Dr. Lenard, who has now taken his place at the Bonn University, took up the subject with the great desire of obtaining these cathode rays in the open air, where one could get at them and study them with less hinderance. To accomplish this he put a little window in his tube. As I have told you, Hertz had found that some substances were easily transparent to the cathode rays, and that of the metals aluminum was the most transparent,—that is to say, it was the metal which would allow the cathode rays to pass through in greatest volume; so Lenard made a small window in his Crookes tube of aluminum about three thirty-seconds of an inch or less wide. This was a very delicate piece of work, because if he had the aluminum too thick the cathode rays would not go through it as satisfactorily as he wanted, and if he had it too thin the atmospheric pressure would break the tube. Nevertheless, he succeeded in getting the cathode rays to come out into the open air. Immediately on putting in his window and turning on the electric current he received a surprise which delighted him, for the whole air around the window for the distance of eight centimetres glowed with quite a bright purple glow, and he found that substances would luminesce outside of the tube in the air as well as inside, but the effect was not produced to any great extent and was absorbed by any great thickness of air. The rays outside of the tube could not traverse any great distance; nevertheless, they were deflected by the magnet and showed every characteristic of the cathode rays in the tube. He then attached to the end of his Crookes tube a long tube with a number of luminescent screens in it of varying density and arranged it so that he could vary the vacuum. He found that the higher he carried the vacuum the farther the cathode rays would pass, and that they would affect a photographic plate in the air a distance of about eight centimetres. There he

stopped. He used his photographic plate, but he exposed the plate directly to the cathode rays. That was the only point that he differed from Professor Röntgen.

That was the point at which this matter stood last December when Professor Röntgen, who was also experimenting on these lines, made his great discovery by purely a matter of chance. He happened to be working with a tube that was covered with black paper. He had found that light had a bad effect on the tubes, and that they would deteriorate unless kept in darkness. He had just covered this tube with this black paper and turned on the current, when he noticed that a piece of platino-barium-cyanide paper which was near the tube glowed. Also, afterwards, in developing a photographic plate which had been lying near the tube on the table, he found not only the picture that he was working for on there, but also the image of a little brass spring on the plate-holder. How it came to get into the picture he could not understand, except that the plate in its holder was standing up near the tube at the time when he noticed the paper glowing, and it was in such a position that the spring was between the plate and the tube. Now, there was no window in this tube, so he knew that the cathode rays had not come out in their usual manner and affected the plate, but that it had been affected by some invisible agent. Of course that put him on the right track immediately, and it was not a very great while before he announced to the world that substances which had hitherto been considered opaque were transparent to the effects of an unknown agent which he called the "X-rays."

Just a word as to the apparatus with which Professor Röntgen conducted his experiments. He did not use any elaborate or specially designed apparatus, but simply a vacuum tube and an ordinary Rhumkorff induction coil. A current was set up in a small battery, causing a secondary spark to pass through the Crookes tube which was connected to the poles of the induction coil; the tube was illuminated, and of course produced its effects. He studied the source of the rays very thoroughly,—in fact, he made a very beautiful investigation before he mentioned anything about it at all, and there is hardly a thing been since noted with regard to their effects which was not at least suggested if not tried by him. It was a most thorough investigation. Among other things, he examined the source of the rays, and while he could make no positive statement as to the exact manner in which they were produced, he declared that they could not by any possibility be the cathode rays: first, because the Röntgen rays can never be

deflected, the most powerful magnetic fields that we can produce have apparently no effect in turning them from straight lines; secondly, the Röntgen rays travel enormous distances, whereas the cathode rays do not reach more than eight centimetres. The effect of the Röntgen rays has been traced through six men,—that is to say, the testing apparatus would be affected beyond and through that thickness of flesh.

As soon as Röntgen published his paper, the investigation was taken up by physicists all over the world with a great deal of energy. One of the first questions which they sought to find some answer for was, What was the source of the rays? This question has not yet been satisfactorily answered, as their origin cannot be traced beyond the luminescent spot on the tube. The point on the tube where the cathode rays struck and produced their brilliant green luminescence was apparently the source of the rays, but, as I have said before, they were not the cathode rays. He called them the "X-rays." Some of the investigators thought that these rays were not related to the cathode rays; Professor Rowland, for instance, claiming that they proceeded from the anode. Professor Elihu Thomson also thought so, but later recanted, and said he did not think that was the fact. Rowland afterwards said that he would prefer to investigate further before making any statements as to what he thought was the source of the rays. Experiments were continued, and it has finally been settled upon that the Röntgen rays are produced at the first point that intercepts the cathode rays.

Now, the Röntgen rays had been excited by means of the ordinary Rhumkorff coil, and it was not long before we found that that had an effect of heating the tube, which apparently had a deleterious effect as regards the production of these rays, and it was only a brief time before the tube would be destroyed. Some years ago Professor Thomson and Tesla were both experimenting in the same line, with what is called the high frequency alternating current, which oscillates something like a million times a second, and that discharge, at high frequency, is perfectly innocuous to the human body. You could receive a spark on your hand and you would never know it touched you, so that we thought possibly that with that very high oscillation we could get a current which would excite the tube and not produce these unfortunate heating effects. That proved to be so, and, moreover, as we could get a great deal of electrical energy into the tube without damaging it, we had more powerful effects from the rays and more distinct photographs.

Coming down, then, to the static influence-machine, which is something like the common frictional machine, except that the current is not produced by friction but by induction, we secured even better results with that than with the high-frequency current. A photograph which we could take in perhaps ten minutes with the friction-machine, we could take in a few seconds with the influence-machine. This influence-machine is driven, generally, by a small motor, though the power may be obtained in various ways, and we allow its spark to pass through the tube from anode to cathode, and under certain conditions (which are not ready for publication until the system has been thoroughly tried), when it is wired in a certain way, we seem to get very much more powerful effects than we do in any other way.

We come now to the examining or testing apparatus by which the effects of these invisible rays are made visible to us. One of the simplest tests is the photograph. If, for instance, you wish to take a photograph of the hand, you put a sufficiently sensitive plate in a plate-holder and place your hand on the cover, turn on the rays, and you will get a photograph of the bones and denser tissues of the hand, simply because the ability of the rays to penetrate substances varies almost directly as the density of the substances through which the rays are passing. The photograph, however, is open to certain objections. In the first place, it requires a certain amount of time to take and develop the picture; and, secondly, it furnishes a permanent record, which in some cases you do not want, as your picture may not prove to contain what you are looking for, and this method is not quite so satisfactory as if you could examine the object itself instead of the photograph of it. Mr. Edison has made this possible by the invention of the fluoroscope, which is a large pyramidal box built after the plan of those stereoscopes that you view by reflected light, only in place of the ground glass screen at the larger end of it, there is a paper which is coated with a surface of tungstate of calcium. Now, tungstate of calcium can be prepared either by crystallization or fusion. When prepared chemically, by crystallization, it does not luminesce at all, and is perfectly worthless for the purpose for which we need it; when it is prepared by fusion in a furnace, it will luminesce with the most astounding brilliancy. That piece of paper is put in the box, and then if we wish to make an examination of the hand, we should put the Crookes tube here and hold the hand up and look through the fluoroscope, and we see on the illuminated screen beyond a shadow picture, portions of the shadow appearing

darker or lighter according to the density of the tissue through which the rays have to pass. The photographs are not to be compared with the picture as seen in this way; you will see not only every bone and its joints, but when properly adjusted you can see the cartilage, the folds in the skin, the lines of the cords, and even the nerves sometimes, and all with the most wonderful clearness. We have succeeded in forcing the rays through the body sufficiently to enable us to determine the exact location and size of the various organs, and the subject has been of the deepest interest to those who, at the Institute, have been working with Mr. Norton, one of the instructors in physics there. I, myself, have not been working very much with the rays. being engaged in another line of study at present; but I have endeavored to keep posted on the experiments and improvements that have been made by others. They have been able to see. with the aid of the rays, the condition of the lungs of a person in advanced consumption; have traced out with perfect clearness on that screen the diseased portion.—it can be distinguished by its absolute opacity compared with the healthy tissue, which is quite transparent. A case of enlarged spleen has shown up quite satisfactorily; you can see the liver rise and fall, and determine the exact position of the organs within one-sixteenth of an inch; you can just see the tip of the kidney, which is apparently more opaque and denser; the liver rises and falls in front of it as the patient breathes; you can see the ribs, which look like the boards of a gate; you can see the spine with its many joints; you can see the sharp definition of the teeth as they run down into the jaws, and the limits of a filling that is put into a tooth. We are still trying to get more sensitiveness and power in the apparatus in order to make visible a great many things which do not show up now.

I have brought down a great number of photographs which will serve to illustrate the various steps which we have gone through from our first efforts, requiring several minutes, to the present system by which a photograph may be taken in a few seconds. This first one is simply an ordinary bunch of keys taken through one-quarter of an inch of aluminum, and a watch-chain taken through one quarter of an inch of hard rubber, and in this instance the exposure was three minutes. To show you how the time for exposure has been diminished, here is one that was exposed for forty-five seconds. It is a pocket magnifying-glass and a piece of curved wire taken through. Here is a picture of a normal hand and one of an abnormal hand taken at the City Hospital; the idea

was to show the difference between the two. In the abnormal one, one joint of the first finger is missing, and the middle joint is very much distorted. Here is one taken with only a part of the power, but with the plate close to the luminescent screen, with the idea of seeing whether the luminescent substance close to the plate would increase its sensitiveness or not. Apparently it had no effect. Here are photographs of the hands of Mr. and Mrs. Norton, taken with the high-frequency current. There was a diamond ring on Mrs. Norton's finger, but as diamonds are very transparent to the rays, only the gold can be seen in the photograph. After we had succeeded in doing that, we thought we would try a clinched fist and forearm, which is shown on that slide quite clearly; then we tried an elbow joint and the rest of the arm,—this one is pretty dense because of the thickness of the bone, but here is another one of the same elbow from a different point of view, and you can even see the cords without any difficulty at all. This is the hand of a negro who was struck in the wrist by a 22-calibre pistol-ball, and the Röntgen rays show it embedded in the bone, right there, with perfect clearness. Then this next one is the hand of President Walker, of the Institute, which was struck by a splinter of a shell and quite badly broken, so that the bones are very much distorded, and right under the palm of the forefinger is what looks like a little splinter of the shell.

We then changed over to the static influence-machine, and you will notice the improvement in the photographs obtained. They are very much clearer and the time of exposure is very much shorter than with the earlier apparatus.

PYORRHŒA ALVEOLARIS FROM A NEW STAND POINT.[1]

BY WILLIAM H. TRUEMAN, D.D S., PHILADELPHIA.

In a paper read at the last meeting of the Kentucky State Dental Association,[2] Dr. Junius E. Cravens, who for a long time has made a close study of pyorrhœa alveolaris, advanced somewhat

[1] Read before the Academy of Stomatology, October 27, 1896.

[2] Pyorrhœa Alveolaris; or, Riggs's Disease: Etiology, Pathology, Characteristics, Treatment. Read at the Twenty-sixth Annual Meeting of the Kentucky State Dental Association at Louisville, June 16–18, 1896. The Dental Digest, vol. ii., August, 1896, p. 435.

novel ideas bearing upon this disorder. Accepting the theories advanced by two recent medical writers[1] upon conditions which he assumes are closely allied to pyorrhœa alveolaris, he has modified somewhat the treatment he suggested in his treatise upon this subject,[2] published two years ago, and now recommends a procedure very closely resembling that advocated by Thomas Berdmore, a distinguished dentist of London, in a work he published in 1770;[3] so closely, indeed, that we are tempted to ask, Have we, in the intervening century and a quarter, simply swung around a circle?

The treatment recommended by Dr. Cravens in his recent paper, briefly stated, is this: After removing all deposits from the affected roots, he lacerates or even tears away the granulation tissue within the pockets. Then applies an astringent stimulant of acidulated nature. This is followed, after sufficient time has elapsed for granulations of repair to be well set up, by an astringent stimulant of a more pronounced and permanent effect. The object of this treatment is to establish *scar tissue.* He assumes that pyorrhœa alveolaris is a periostitis, and advances the name, *alveolar periostitis*, as proper and fitting for this affection. The cure of periostitis, he says, demands the establishment of scar tissue, basing this assumption, he explains, upon certain statements by Dr. R. H. M. Dawbarn in a chapter upon periostitis, ostitis, etc., in the "Reference Hand-Book of Medical Science," and also certain statements in Greene's "Pathology and Morbid Anatomy," both recent publications.

Berdmore says,[4] treating of a condition which we readily recognize as pyorrhœa alveolaris of to-day, "The treatment is partly medical and partly surgical. The former consists in removing the original disease of the whole body by a due course of medicine, and in washing the mouth frequently with antiseptic and astringent liquors, rendered slightly acid by means of orange, lemon, or sorrel-juice, or vinegar. The surgical treatment consists in scarifying and pricking the affected gums, and destroying their tender outer skin in such a manner as to occasion a fresh shooting forth and

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[1] Dr. R. H. M. Dawbarn, in the Reference Hand-Book of the Medical Sciences; Greene's Pathology and Morbid Anatomy.

[2] A Treatise on Pyorrhœa Alveolaris. Junius E. Cravens, D.D.S., Indianapolis, 1894.

[3] Treatise on the Disorders and Deformities of the Teeth and Gums. By Thomas Berdmore. London, 1768; Dublin, 1769; second edition London, 1770.

[4] Ibid., edition 1770, p. 66.

elongation of their substance, and such a solidity as will endure the usual impressions of mastication. When the gums have lost their connection with the teeth, or when they do not embrace them closely, cutting a small slip away from the forepart is of considerable service, for the new gum will then adhere to the tooth, or at least will embrace it more closely." During the time necessary for completing the cure in this manner opiates, solution of camphor, or a few drops of nitrous ether in common spirits may be used to mitigate or remove the pain. He explains that sometimes one will give relief, and at other times the other. He recognizes the importance of first thoroughly cleaning the teeth of all deposits, and states that the scarifying or cutting of the gum may have to be frequently repeated. He relates a case,[1] where "the incisors of both jaws were entirely naked to the extremity of each root," that required five or six operations, stating that after a perseverance of six weeks the gums were completely restored, and have remained sound ever since by the assistance of astringent washes and brushing. Berdmore claims that when the patient will submit to the necessary treatment and follow closely his directions, the surgeon-dentist will seldom fail of success in cases of this kind. Teeth that are very loose, or badly injured by caries, he recommends should be extracted, that being for such teeth the only cure.

This close identity of the latest suggested treatment of pyorrhœa and that in vogue so long ago is quite suggestive, and well deserves your careful attention. I say, in vogue so long ago, for Berdmore does not claim this treatment as his; indeed, it seems to have been the common practice long before his advent into the dental world.

Unanimity of experience in treating this disorder seems to have been in that day, as in this, sadly wanting. Robert Wooffendale, writing in 1783, referring to the treatment recommended by Berdmore, and to the case Berdmore especially reports, says,[2] "Such cases I have frequently seen, but never cured one, or saw one of the same kind, or anything like it cured by any other person." He further says, "Lancing the gums, to prevent the scurvy in them, is with some people a fashionable operation, and which they have performed regularly once a month; some once a week, or oftener; supposing it will prevent or remove all complaints of the

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[1] Berdmore, edition 1770, p. 70.

[2] Practical Observations on the Human Teeth. By Robert Wooffendale, London, 1783; p. 114.

gums, teeth, and their connections. By observation, however, this operation performed in such manner by no means proves such expectations well founded. The operation, frequently repeated, may be lucrative to the operator; but in my humble opinion is of little, if any, advantage to the teeth or gums of the patient."[1] He recommends to prevent this condition the daily use in the morning of an astringent lotion, taking care to have any small portions of tartar that may adhere to the teeth under the edges of the gums removed by the instrument of a careful dentist, and the frequent use of a proper dentifrice so as to keep them as clean as possible. Where this treatment is strictly attended to he believes the disease will very seldom make its appearance, and in recent cases it is generally sufficient to prevent its farther progress.

When through long neglect the disease has made progress, but not yet reached the incurable stage, it is generally proper, he says, "to lance the gums, and sometimes to repeat it daily for a fortnight, a month, or longer. When the gums are much thickened by this disorder considerable portions of them should be cut off, which in many cases I have done, and the patient has not been sensible of the least pain till the operation has been repeated several times."

Robert Wooffendale was a student of Thomas Berdmore. I note here and there throughout his book a disposition to give his preceptor a *sly rap* now and again. I note also, in dental literature of recent date, this disposition is still manifested by some of our profession who fail to see matters in the same way their brethren do. I still further note that this disposition at times is a serious clog to real progress, in that it provokes antagonism, fosters an unreceptive spirit, and prevents that bringing together, careful sifting, and equitable comparison of our varied experiences, by which process alone can they be made practically useful.

Berdmore considered this disorder curable, even when it had far progressed, and claimed as part of the cure a reproduction of lost tissue. Wooffendale claimed that it is *usually* curable, so long as there remained embedding the roots of the teeth enough tooth-supporting tissue to securely hold them. He contends that to restore to health the disordered tissues is all that can be expected; and both agree that to retain them in this condition requires constant care and continued watchfulness on the part of the patient.

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[1] Practical Observations on the Human Teeth. By Robert Wooffendale, London, 1783; p. 111.

Wooffendale further says, and this with emphasis,[1] "When the exposure of the root is occasioned by accident, as a bruise, a cut, or the like, it will frequently be readily restored by nature, generally without the assistance of art, but when the smallest part of the roots of the teeth are exposed, in consequence of the adhesion of tartar on them, by the scurvy in the gums, venereal infection, or the imprudent use of mercury, I never saw the least disposition of the gums to grow to the teeth, although assisted by scarification, or by stimulating, balsamic, astringent, or any other sort of washes or applications; the gums would as soon grow to a piece of ivory or iron as to the root of a tooth which has lost its periosteum from any of the causes here alluded to." Jourdain writes dolefully of this disorder and says,[2] "Those who think they have made cures by scarifications, etc., by cautery, issues, and the like, have confounded this with suppurative fungus of the gums alone. I have seen many cases treated by these so-styled success ful remedies, and I may safely say I have yet to see the first cure performed."

How very like the remarks in reported discussions on this subject, in this year of grace eighteen hundred and ninety-six, are these, culled from writers of more than a century ago, writers who were well conversant with, and who have accurately described this and other allied disorders of the teeth and gums, that in their day, as in ours, in spite of their efforts and in spite of our efforts, result in a much-to-be-deplored tooth loss. With them, as with us, whether these disorders were merely local, or were wholly or in part systemic, was a much-debated question; indeed, a careful study of the accurate and full records they have left makes one ponder and prompts the question, What do we know of these disorders that they did not know?

When, where, or by whom the term pyorrhœa alveolaris was first used I do not know. The older writers described the conditions we usually associate with that expression under various names,—scurvy of the gums, recess of the gums, erosion of the gums, fungus or gangrene of the gums, conjoined suppuration of the alveoli and the gums, etc. At that day, as in this, writers were not careful to use exact terms in describing nearly allied pathological

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[1] Practical Observations on the Human Teeth, p. 107.

[2] Diseases and Surgical Operations of the Mouth and Parts Adjacent. M. Jourdain, Paris, 1778. Translation published by the American Society of Dental Surgeons, Baltimore, 1849, p. 352.

conditions, and no doubt then, as now, this was a factor largely controlling success or failure of treatment.

Most earnestly would I urge upon those making a special study of this and allied disorders, a thorough research and careful study of its literature. I question if any department of our art has been more carefully studied or more fully written up than has been the disorders and diseases of the tissues surrounding the teeth. Fauchard, Bourdet, Ricci, and other able writers and observers made of the diseases of the gums and the effects of systemic disorders upon the gums and teeth a careful study. They visited the hospitals, and in conference with physicians and surgeons earnestly and zealously labored to master the same conditions that confront and baffle us of to-day. Many writers of to-day, giving the results of their recent studies in this field, would probably be astonished were they to see their productions in parallel column with those of Bourdet, Jourdain, and many others who lived and labored before the present century began. When a writer expresses the opinion that this disorder is becoming increasingly frequent; that it is the outcome of modern ways of living; that it is largely more prevalent as the result of imperfectly performed dental operations, I wonder if he knows that more than a century ago it was so prevalent, so intractable to treatment, so prolific of tooth loss, that the dentists of that day, discouraged and disheartened, labelled it *devastation of the teeth*. Of it Dr. H. H. Hayden, writing in 1822, has this to say:[1]

"This disease, from the nature and extent of its ravages, as great or more so among the opulent and rich as among the poorer classes of society, has, at different times, engaged the attention of some of the most skilful physicians, as well as professional dentists, in Europe; and, in the course of treatment which they have pursued, they have, severally, resorted to every means for its cure that medical skill could suggest,—such as emollient, astringent, and detergent gargles of various kinds; astringent, tonic, and antiseptic elixirs; mercurial washes, absorbent powders, aromatic pastes, electuaries, alteratives, sedatives, venesections, vesicatories, injections, setons, issues, excision of the diseased parts, scraping the diseased bones, repeated applications of the actual and potential cautery, etc.,—notwithstanding which, their efforts have proved ineffectual."

Scurvy, scrofula, catarrh, syphilis, malnutrition, rheumatism, gout, mental diseases, care, worry, anxiety, etc., are among the systemic conditions or disorders that have been credited with its causa-

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[1] American Journal of Dental Science, vol. ii., March, 1842, page 229.

tion, while now and again various remedial agents have been held responsible for the mischief it has wrought. Some of the older writers have observed that persons subject to gout or rheumatism were seldom afflicted with this disease; on the contrary, those afflicted with suppuration of the gums are seldom troubled with gout or rheumatism; while recent writers contend that gout, rheumatism, and pyorrhœa have a common origin and are frequently associated. From the earliest mention of this disorder to the present hour, regarding it, our profession has been quite unsettled, and, as a natural result, much time and labor has been expended in rehabilitating discarded theories or in the effort to supplant one unsatisfactory theory by another equally at variance with observed facts. Fauchard was inclined to reject the theory that certain diseased conditions of the system were the cause of it, because he had frequently seen cases where the systemic diseases were well marked and this trouble did not exist; and also from having observed the converse of this, cases where this trouble was well marked and no systemic disease was present; and the further observation, that remedies suited to those diseases had no effect whatever upon the oral trouble. He regarded the coexistence of the two as a mere accident, and was more firmly inclined to this opinion from having frequently observed that in such cases, that while the systemic trouble readily yielded to appropriate remedies there was no corresponding improvement in the oral lesion. Systemic treatment, he was impressed, was of little avail. Precisely the same statements have been made at a very recent date, and, while not universally accepted, I am impressed that Fauchard's position in this matter is substantially that of the masses of the profession at this time.

This brings us to the important question, concerning pyorrhœa alveolaris, What do we really know? Upon what points do those who have carefully studied it universally agree? There are, it is a satisfaction to know, a few points upon which there has been little if any controversy; and these may, perhaps, furnish us reliable data for future investigations.

1. It is a disease seldom appearing until the patient approaches middle life. While exceptions to this have been frequently noted, they are, however, infrequent and exceptional, and have been so recognized.

2. It is not, at the onset, usually accompanied by any marked systemic derangement.

3. It usually begins insidiously, runs an uneven course, and is prone to relapse.

4. It always ceases, completely and permanently, when the teeth are lost.

I note that now and again observers have remarked the close resemblance physically, and the very marked differences pathologically, between pyorrhœa and that acute inflammation of the gums, due entirely to systemic conditions, known as stomatitis. This is ushered in by well-marked and unmistakable systemic derangement, quickly reaches its height, responds promptly to systemic treatment, and, as a rule, in mild cases leaves the involved oral tissues but little the worse for its presence. When at its height, this condition resembles closely, so far as it affects the oral cavity, pyorrhœa at its worst. We have the same turgid and swollen gum margins, the same profuse flow of pus from the alveoli, the same fetid odor, and the same loosening of the teeth. Stomatitis, however, is a disease of childhood; pyorrhœa, of mature age. Stomatitis comes on quickly, the acute and violent oral symptoms are merely the expression of a more profound systemic derangement,—a systemic derangement so profound, indeed, as to frequently compromise life. In a mild, uncomplicated attack, it quickly runs its course, and the oral symptoms disappear as quickly as they came. It is very probable that the oral symptoms linking together stomatitis and pyorrhœa are alike due to germ-infection, the sudden and violent onset in stomatitis being due to quickly-developed conditions favoring germ activity, and the rapid subsidence in mild cases, it has been explained, is due to the violent inflammation proving fatal to germ-life. In severe cases so violent is the inflammation that gangrene, with all its attendant seriousness, not infrequently supervenes. In adults the gums are not so responsive to systemic disturbances, nor yet do slight disorders of the nutritive functions, as in early childhood, so quickly or so profoundly affect the general health. Under these conditions stomatitis becomes far less frequent and far less serious. It still, however, preserves its well-marked characteristics distinguishing it from pyorrhœa alveolaris, and these may have value in determining the cause and character of the latter disorder. I am strongly impressed that, after all, pyorrhœa alveolaris is merely a germ-infection. It may be serious, involving a large territory, and incurable, or slight and easily controlled, just in proportion as the oral conditions favor or repress germ activity. How far the general health may affect these conditions we have, as yet, but little reliable data. The pathology of stomatitis is suggestive upon this point. We may bear in mind that for the germ to become a pathological factor three things are necessary: (1) the germ; this,

however, is omnipresent; (2) a dwelling place; (3) congenial surroundings. In stomatitis the disturbed circulation, due to the primal lesion resulting in the swollen gum margins, furnish over a widely extended territory abundant opportunity for germ colonies, and the surroundings seem particularly favorable to germ activity. Disordered digestion in the child and in the adult seems to produce in the oral cavity conditions especially favorable to germ-growth. In proof of this, the furred tongue, for ages recognized as a reliable and delicate indication of gastric disturbance, is now known to be due to the presence of germ-life,—a form of germ-life that immediately disappears when the stomach resumes its normal condition.

In early life, while the gum-tissues firmly embrace the teeth and fully occupy the dental interspaces, there is little opportunity for any form of germ-life to obtain permanent foothold. Later, however, when normal changes materially alter this condition of affairs, when the saliva becomes more loaded with inorganic matter, when there is a more marked disposition to tartar deposits, when the gum-tissues relax their firm embrace of the teeth and as a result *débris* collecting spaces are formed along the gum-margins and between the teeth, when, in addition to all this, as the natural result of normal wear and tear and the inevitable loss of tooth-substance, the gum- and tooth-supporting tissues become more and more exposed to violence and accidents of various kinds during mastication, etc., we readily see how, in a thousand and one ways, opportunities for germ-infection are vastly increased. All without the slightest assistance from any systemic disorders.

We may remember, also, that of all germicides known to science none are so potent, so thoroughly reliable, or so universally accessible as is the natural secretions of a healthy human mouth. Were it otherwise, it would be utterly impossible to find a healthy individual among the many thousands who are compelled to daily breathe the germ-laden dust of a large city. It is only when the germ succeeds in quickly finding a little pouch in which to hide, secure from this, to it, destructive secretion, or when by mere chance it obtains foothold while the potency of this secretion is temporarily impaired, that it has the slightest chance to begin its destructive work. Once firmly settled, it begins to thrive, and a colony once formed creates conditions that may successfully combat its untoward surroundings. Changes constantly taking place in the oral secretions—now favoring and now opposing—fully account for the ebb and flow that marks, in its earlier stages, this disorder. The ravages of the disease, never wholly obliterated after it has once been firmly

established, are ever an open door inviting the frequently noted relapses, until the complete loss of the teeth destroys forever its once favorite camping-ground.

We thus see how fully the germ theory meets all of the few points upon which close observers for nearly two centuries are in perfect accord.

I present it to your notice, not as a new theory, but as a theory fully in line with modern thought, and so fully in accord with observed facts, as to warrant its selection as a new stand-point from which to study the cause and treatment of pyorrhœa alveolaris,—a stand-point much to be preferred to those older theories with which, as I have shown you, our grandfathers labored so earnestly and so long, with so little profit.

SKELETON NOTES ON CATAPHORESIS.[1]

BY DR. LOUIS JACK.

The apparatus in all but one case as noted was the same as employed in the clinic. The millii given is the reading of the current through the dentine.

Case I.—H. H. F.; proximate of second superior bicuspid; cocaine hydrochloride; ten cells; forty-second pin; four-tenths millii; thirteen minutes; relief complete; pulp found to be exposed.[2]

Case II.—N. M.; cocaine hydrochloride; fifteen cells; seventieth pin; eleven minutes; second application; fifteen cells; eightieth pin; two-tenths millii; relief complete.

Case III.—R. M.: left superior third molar; cocaine hydrochlor. eighteen per cent.; fifteen cells; thirty-eighth pin; thirteen minutes; relief complete.

Case IV.—C. M.; cocaine citrate; ten cells; forty-fifth pin; relief nearly complete.

Case V.—G. H. S.; two proximate cavities of lateral and cuspid, caused by caries at the cervical margin of gold fillings. The broad

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[1] Read before the Academy of Stomatology, Philadelphia, October 27, 1896.

[2] There is a striking feature regarding the conservative treatment of the pulp after cocaine cataphoresis. The indications are that the pulps capped after the use of this means of obtunding have given better results, as evidenced by the greater absence of subjective indications of hyperæmia than where capped under ordinary circumstances.

surface of the gold was varnished; the edges next the cavity could not be so treated. Cocaine hydrochlor. eighteen per cent.; fifteen cells; twenty-third pin; twelve minutes; relief nearly complete, there appearing some sensation near the gold.

Case VI.—H. H. F.; right superior second bicuspid; proximate; cocaine citrate twenty-four per cent.; fifteen cells; fifty-ninth pin; ampèrage five-tenths millii; twelve minutes; relief complete.

Case VII.—H. H. F.; distal left superior first bicuspid; cocaine citrate twenty-four per cent.; twenty-eighth pin; fifteen minutes; relief nearly complete; pulp found to be exposed and conservatively treated.

Case VIII.—M. N.; mesial left superior first molar; cocaine citrate; fifteen cells; thirty-fifth pin; sixteen minutes; relief nearly complete, a little sensibility appearing at the close of the grooving.

Case IX.—H. H. F.; right superior second molar occlusal; fifteen cells; fifty-sixth pin; eight minutes; relief complete.

Case X.—Miss E. P.; distal left inferior first molar, extremely sensitive; cocaine citrate twenty-four per cent.; fifteen cells; twenty-eighth pin; fourteen minutes; relief complete.

Case XI.—Mrs. P. W. E.; left superior cuspid, proximal, first application; ten cells; thirteen minutes; second application, fifteen cells; thirty-seventh pin; ten minutes; ampèrage, one-tenth millii; relief complete.

Case XII.—Miss M.; mesial right superior bicuspid; fifteen cells; nineteenth pin; twenty-two minutes; relief complete; pulp exposed.

Case XIII.—Mrs. S. S. M.; right inferior second bicuspid; pulp actively congested. On passing drill through buccal enamel found dentine acutely sensitive. In a moment after this was obliged to withdraw drill. Applied cocaine citrate; fifteen cells; forty-second pin; twelve minutes. The drill was then carried forward without pain, the patient not perceiving when the pulp was encroached upon. It bled freely; applied arsenous acid.

Case XIV.—Mrs. F. C. W.; distal right superior second bicuspid; cocaine hydrochlor.; fifteen cells; fifty-sixth pin; thirteen minutes; relief complete.

Case XV.—Mr. J. C. H.; left superior third molar; buccal surface; fifteen cells; sixty-sixth pin; twelve minutes; relief partial. Here, on account of the position, insulation of the tooth could not be secured.

Case XVI.—Continuation of treatment of Case XIII., four days subsequently. Pulp devitalized half distance; sensibility excessive;

applied cocaine citrate and also the hydrochloride by cataphoresis, without the least impression; also instilled cocaine, which proved equally valueless.

CASE XVII.—Mrs. F. C. W.; mesial right inferior first molar; fifteen cells; thirty-eighth pin; ampèrage, three-tenths millii; relief nearly complete.

CASE XVIII.—W. M. C.; distal right superior first molar; fifteen cells; thirty-fifth pin; ampèrage, four-tenths millii; thirteen minutes; relief complete. In this case there was no electrical irritation until the fourteenth pin had been passed; cavity broad and shallow.

CASE XIX.—Master A. C.; distal left superior first molar; cocaine hydrochlor. twenty-four per cent.; fifteen cells; forty-second pin; eight minutes; relief complete.

CASE XX.—Mrs. F. C. W.; mesial left superior third molar; cocaine citrate twenty-four per cent.; fifteen cells; forty-fifth pin; ampèrage, eight-tenths millii; relief not complete, consequent upon imperfect insulation as evidenced by the ampèrage.

CASE XXI.—Master M. E. B.; mesial right superior first molar; cocaine citrate twenty-four per cent.; fifteen cells; forty-seventh pin; ampèrage, three-tenths millii; twelve minutes; relief not complete; second application, twenty cells; seventieth pin; five minutes; relief complete.

CASE XXII.—Mrs. F. C. W.; mesial right superior second molar; cocaine citrate; twenty cells; thirtieth pin; eighteen minutes; relief complete, except at occlusal margin.

CASE XXIII.—Mrs. T. M. S.; distal left inferior second molar; cocaine citrate twenty-four per cent.; fifteen cells; forty-eighth pin; ampèrage, four-tenths millii; eleven minutes; no relief.

CASE XXIV.—Same patient and same cavity, three days after first application; cocaine citrate; fifteen cells; twentieth pin; twenty minutes; no relief. Patient very sensitive to electrical irritation.

CASE XXV.—B. C.; distal left superior first bicuspid and mesial left superior second bicuspid; fifteen cells; thirtieth pin; relief only partial.

CASE XXVI.—Mr. H. H.; distal left inferior second bicuspid; cocaine hydrochlor. twenty-four per cent.; fifteen cells; fifty-sixth pin; eleven minutes; relief complete.

CASE XXVII.—Miss L. N.; distal second molar; cocaine hydrochlor. twenty-four per cent.; 110-volt Edison current, with Flemming's controller carried through one-fourth of the circuit; twelve minutes; relief nearly complete.

Case XXVIII.—Miss E. C.; mesial left superior lateral; fifteen cells; thirty-sixth pin; thirteen minutes; relief complete.

Case XXIX.—Master H. Du P.; mesial right superior central; cocaine hydrochlor. twenty-four per cent.; ten cells; fortieth pin; thirteen minutes; relief almost complete.

Case XXX.—Same patient; distal right superior cuspid; cocaine hydrochlor. twenty-four per cent.; ten cells; fortieth pin; twelve minutes; relief complete.

Case XXXI.—Master W. S. G.; distal right superior central; cocaine hydrochlor.; ten cells; thirty-fifth pin; ampèrage, one-tenth millii; fourteen minutes; relief complete. For this patient it had previously been necessary to administer ether to permit the preparation of carious cavity.

Case XXXII.—Mr. H. H.; distal left superior central and mesial of left superior lateral; cocaine hydrochlor. twenty-four per cent.; fifteen cells; forty-second pin; ampèrage, one-tenth millii; twenty-four minutes; relief of central complete. In the final cutting of the lateral, some pain.

Case XXXIII.—Same patient; mesial of both superior centrals; cocaine hydrochlor. twenty-four per cent.; fifteen cells; fifty-sixth pin; ampèrage, one-tenth millii; twenty-four minutes; relief nearly complete. In these cases the sensibility was of unusual acuteness.

Case XXXIV.—W. McG.; mesial right inferior first molar; cocaine hydrochlor.; fifteen cells; fifty-sixth pin; ampèrage, four-tenths; twelve minutes; relief complete. Pulp found exposed and conservatively treated.

Case XXXV.—Miss M. N.; mesial left superior first molar; cocaine hydrochlor. twenty-four per cent.; fifteen cells; ampèrage, four-tenths millii; fifteen minutes; relief nearly complete. Slightly sensitive at inner margin.

Case XXXVI.—Same patient; right inferior second bicuspid; cocaine hydrochlor.; fifteen cells; fifty-sixth pin; ampèrage, seven-twentieths millii; nine minutes; relief nearly complete.

Case XXXVII.—Same patient; distal left inferior second bicuspid; cocaine hydrochlor.; fifteen cells; fiftieth pin; ampèrage, three-tenths millii; thirteen minutes; relief complete.

Case XXXVIII.—Mrs. A. J. D.; distal left superior lateral; cocaine hydrochlor.; fifteen cells; thirty-sixth pin; ampèrage, two-tenths millii; thirteen minutes; relief complete, except at the occlusal margin.

Case XXXIX.—Miss A. H. H.; mesial left superior first bicuspid; cocaine hydrochlor.; fifteen cells; forty-eighth pin; am-

pèrage, two-tenths millii; seven minutes; relief absolute. At the close of the application the patient fainted, manifesting considerable cyanosis. The syncope was probably due to nervous impression caused by the result of a previous medical administration of electrical current, when the same condition ensued. During the application there was no electrical irritation of the tooth.

Case XL.—Mrs. J. H. P.; mesial left inferior third molar; caries extending below the gum; pulp evidently exposed and dentine extremely sensitive; insulation imperfect; cocaine hydrochlor. twenty-four per cent.; fifteen cells; twenty-third pin; ampèrage, four-tenths; thirteen minutes; relief not complete, but sufficiently so to permit removal of caries and the uncovering of the pulp.

It were well to state that in some instances, where the relief did not appear absolute, the results would probably have been more satisfactory had the current been longer continued.

Abstracts and Translations.

PUTTING A PORCELAIN FACING ON A LIVING HONEY-COMBED INCISOR.

BY P. HEADRIDGE, L.D.S.I.

The object of this operation is to improve the appearance of a honey-combed tooth without destroying the nerve.

In the case demonstrated the tooth was shortened as much as possible without cutting too near the pulp, as the tooth was found to be too frail towards the cutting edge to serve as a support for the porcelain face. (In cases where it is possible it is better to leave the palatal surface of the natural tooth entire, as a better support is given to the porcelain face, and there is then less danger of fracture from pressure of the bite.) The labial surface was ground flat down to a line or so below the level of the gum. During the grinding the tooth was isolated by the rubber dam and a stream of ethyl chloride was kept playing upon it, thus rendering the operation nearly painless. The natural tooth thus prepared presented a flat labial surface and a flat surface at the cutting edge. A plaster impression of the tooth was taken and cast with fusible

metal. A good thick vulcanite tooth (Ash's make) of the right shade was selected, and the pins cut off and the tooth fitted to the metal model. The shoulder of the vulcanite tooth was fitted to the flat surface at the cutting edge of the natural tooth, the fine fitting being accomplished in the mouth. Two holes were next drilled in the natural tooth on the labial surface, one on either side of the pulp-chamber, and in doing this the demonstrator pointed out that they must not be drilled through to the palatal surface. A very narrow strip of platinum plate (No. 4 or 5), less than one-sixteenth of an inch wide, was fitted so that an end dips into each hole. The mineral face was then smeared with wax in order to ascertain where the groove was to be cut for the platinum to be fused into.

After the grove had been cut the bent platinum pin was held in its place in the groove by a trace of wax. The mineral face, with the pin waxed to it, was next placed on the natural tooth to obtain the exact position in the mouth. The face was then removed with the platinum still waxed to it and a low fusing body placed round the platinum, so that when the body fused it filled up the groove and so fused the platinum pin securely in its place. The face, when baked was cemented with the natural tooth with an osteoplastic. Special care must be taken that there is no undue pressure from the bite, and it is also advisable to leave the cement several days until it is thoroughly hardened. The edges may then be finished off and polished, and the operation thus completed.—*Journ. British Dental Association.*

Reports of Society Meetings.

AMERICAN DENTAL ASSOCIATION.

(Continued from page 737.)

August 5, 1896.—Second Day.—Morning Session.

Meeting called to order at 9.15 by the President, Dr. Crawford. The minutes of the previous session were read and approved.

The Executive Committee reported that they have appropriated funds for the payment of the expenses of the Committee on the National Museum and Library at Washington.

Section V., Materia Medica and Therapeutics, presented a paper

by Dr. Joseph W. Wassall, of Chicago, entitled "The Disinfection of Pulpless Teeth." The same section also exhibited some specimens prepared by Dr. King, of Fremont, Nebraska.

Dr. Wassall's paper follows:

"Are current methods of practice in the treatment of teeth with necrotic pulps strictly in accordance with modern views of asepsis? Judged by what is said and written for societies, periodical literature, and text-books, which may be presumed to fairly represent the methods in common use, this question must be answered negatively. It would seem then that no apology is required in bringing before you so trite a subject; on the contrary, if the inference which my question raises is correct, it is eminently proper that this representative body should give the matter its serious consideration.

"Given a tooth with a decomposing pulp, what is the nature of the pathological state with which we have to deal? We find a condition in which the pulp-chamber, root-canals, and dentinal tubules are loaded with putrefactive animal matter. One has but to recall the large amount of soft tissue contained in dentine and its formative organ to realize the danger of the situation. The recent analyses of dentine made by Dr. G. V. Black and reported by him in the *Dental Cosmos* for May, 1895, gives an average of 25.36 per cent. of organic matter, and 10.06 per cent. of water. The pulp would constitute additional soft tissue amounting to about one-third of the bulk of the dentine.

"Now, while the removal of this necrotic mass from the chamber and canal, and the disinfection and filling of the vacated space is a manifest necessity, and is the general teaching and practice, I contend that there is not a general appreciation of the fact that the dentine itself continues to remain aseptic. It is for the purpose of emphasizing the necessity for scientifically sterilizing this putrid zone of dentine that this paper is offered.

"What is the chemical and physical nature of this putrescent soft tissue? Putrefaction is a fermentative decomposition in dead animal tissue, produced by a class of micro-organisms termed saprogenic bacteria. Professor W. D. Miller, in his 'Micro-organisms of the Human Mouth, 1890,' says, 'The fermentation of nitrogenous, and more particularly of albuminous substances, which is accompanied by the development of large quantities of gaseous and stinking products, is called putrefactive fermentation, or simply putrefaction.' The definitions given in the latest editions of Foster, Gould, and Dunglison are almost identical with the above.

"McFarland ('Pathogenic Bacteria,' 1896) describes the chemical changes taking place in the process of putrefaction as follows: 'The first step seems to be the transformation of the albumins into peptones, then the splitting up of the peptones into a large number of gases, acids, bases, and salts. In the process the innocuous albumins are frequently changed to tox-albumins, and sometimes to distinct animal alkaloids known as ptomaines.'

"To quote Miller again (*ibid.*): 'This name (ptomaines) has been given to certain waste products of bacteria closely resembling vegetable alkaloids, which are formed in putrefying mixtures.'

"Ptomaines have exceedingly poisonous properties. According to Brieger (an authority on this subject), they may have an action on the animal body similar to snake poison and curare. Extended researches into the nature of these substances made by Bergman, Panum, Brieger, Suelzer and Sonnenschein, Vaughan, and others prove that their toxic properties abundantly suffice to produce the violent inflammatory phenomena which are observed to follow the contact of putrescent pulp matter with the living tissue. Is it not apparent, then, that the mere enunciation of the canal contents and a single application of any known antiseptic is insufficient to sterilize or render permanently innocuous these deleterious alkaloids? Yet every day such doctrine is enunciated, and such methods are advocated and have authority because they pass unchallenged.

"There are three classes of cases in which we have pollution of the dentine by putrefactive products:

"1. Teeth, the pulps of which have perished from encroachment of caries, the pulp-chamber being open.

"2. Teeth, the pulps of which have died from proximity of a large filling, attempts at capping, or insufficient sterilization of the layer of caries allowed to remain over a pulp.

"3. Pulpless teeth, the canals of which have been imperfectly filled or sterilized, or both.

"A tooth, the pulp of which has been devitalized intentionally, is excluded from consideration in this connection, for the reason that under ordinary aseptic precautions putrefaction does not occur.

"The essential pathological condition to be recognized is the same in all three cases given. We have dead dentine infiltrated with matter highly irritating and poisonous to living tissue in intimate contact with vital cementum, which in turn is closely enveloped in pericementum.

"What must the effect be on the cementum and peridental mem-

brane of the *materies morbi* which are present in the underlying dentine? There is no escape from the conclusion that it must account for many morbid conditions, the etiology of which is sometimes obscure. There are no doubt exceptions (many of you may call them to mind) of teeth in this state which cause no discomfort. A little more time may prove that even these cases will not remain quiescent. Unquestionably this condition is responsible for numerous affections more or less difficult of diagnosis, varying from reflex neurosis to remotely situated abscesses, the only subjective symptoms in the causative tooth discoverable being a slight sense of lameness in mastication or to palpation.

"What treatment does this pathological state indicate? It will not be uninteresting to first notice some of the methods which have of late been prominently set forth.

"The transactions of the World's Columbian Dental Congress contain an article by Professor Miller, entitled 'Concerning Various Methods advocated for obviating the Necessity of extracting Devitalized Tooth-Pulps,' in which, while recognizing the greater value of complete root-canal filling, he advises for general practice the removal of the bulbous portion only of the pulp, and the covering over of the remaining portion with a tablet composed of slowly-dissolving antiseptics, such as sublimate and thymol combined. The distinguished author confesses that teeth so treated inevitably give trouble, if the victim lives long enough, which is condemnation sufficient. This, together with other variations upon the process of mummification, as advocated by Witzel, Herbst, and Soderburg, are only temporarily effective, because, to use Dr. Harlan's words, 'they will not stay mummified.' Is it not a fact that the only pulp which may be successfully mummified is the living pulp,—or, to be more accurate, the mummifying agent must be applied before pulp death. This would explain the observed efficacy of the oxychloride of zinc pulp-capping operation.

"Emil Schrier, at the same Congress, presented a method of destroying pulp-remains with a mixture of sodium and potassium, which is objectionable on the ground that the action of the drug does not extend into the entire depth of the tubules. Dr. J. Foster Flagg (whose name has far-reaching influence), in a paper read before the New Jersey State Dental Society (published in the *Dental Cosmos* for March, 1895), places the stamp of his approval upon this unscientific procedure. He says, 'I desire to combat to the utmost the claims of thorough removal of pulp-tissue as a matter of *first* importance.' He also makes use of a fifty-per-cent. solution

of sulphuric acid for opening up the putrescent canals, which is contraindicated because it is a coagulator of albumen.

"Dr. M. L. Rhein, in a paper read before the Second District Dental Society of New York, and published in the *Dental Cosmos* for March, 1896, presents his method of treatment of acute and chronic alveolar abscess. The treatment he therein outlines is insufficient for the disinfection of putrid dentine. It is inadequate to the requirements of the condition, because the disinfectant applications are not continued for a long enough period of time. He also falls into the error of using coagulating agents for the first surgical proceeding, when it is quite probable that at the time the tubular structure of the dentine contains albuminous matter.

"Professor Abbott has written a work on dental pathology and practice, which, owing to the author's eminent position both as an educator and practitioner, will be widely read.

"It is particularly unfortunate for the younger members of the profession, whose methods are most likely to be influenced by it, that that chapter devoted to the consideration of this question should be so inconsistent with modern bacteriological knowledge. It is somewhat startling to find that 'until within a comparatively few years, there was no apparently rational or successful treatment for pulpless teeth except extraction.'

"Shades of Parmly, Harris, Townsend, Atkinson, and Maynard! The filling of root-canals has been orthodox dental practice for more than half a century. There are many gentlemen present at this meeting who have filled canals for thirty or forty years. Dr. McKellops told me yesterday that he recently saw a tooth still in the patient's mouth, in which he filled the root-canal with gold-foil over forty years ago. Dr. Corydon-Palmer has filled root-canals since 1839.

"Dr. Abbott imparts a lucid understanding of the fact of putrid dentine and the conditions to be overcome; but the treatment proposed is contrary to the commonest laws of asepsis. The triumph of modern surgery is secured by striving to prevent the entrance of germs into rather than their destruction after admission to a wound. How hazardous to teach that a pulpless tooth may be operated upon without first using the rubber dam! The neglect of this precaution against the ingress of the myriads of micro-organisms, which are always present in the human mouth, is hardly excusable at this day. Dr. Abbott also recommends the use of bichloride solutions for syringing out the pulp *débris*. This is of doubtful utility, because, like nitrate of silver, it is at once precip-

itated in the presence of albumens, thus losing its germicidal and antiseptic powers. (McFarland.) It is also bad practice to pump zinc chloride through a tooth to cauterize a pus-sac until a course of treatment for sterilization of the dentine with diffusive disinfectants has first been completed.

"These few criticisms are submitted in order to substantiate the charge made at the opening of this paper, that much of the modern practice in the management of pulpless teeth does not conform to the present status of bacteriological science.

"The successful treatment of teeth contaminated with putrid pulp-matter would to my mind seem to depend upon the strict observance of two details of procedure,—

"1. The exclusive use of diffusible disinfectants.

"2. The repeated and continued application of the disinfectant dressings for a sufficient length of time.

"The reason why I give diffusible disinfectants the preference over coagulating drugs is because I am satisfied that their exhibition at the pulpal orifices of dentinal tubules forms a plug of coagulated matter which prevents the further ingress of the disinfecting agent, imprisoning within the tubules putrefactive matter which will be a permanent source of irritation to the cementum and pericementum. Again, if the position so ably maintained by Truman and Kirk is true (but which is not substantiated),—that the entire contents of the tubuli are coagulated,—there is nothing gained, for the resulting mass, it is well known, is suitable pabulum for micro-organisms. Hence, there would be no assurance that putrefaction would not recur within the tubules.

"As bearing upon the controversy regarding the relative merits of coagulating and diffusive disinfectants, I desire to draw attention to some recent experiments reported to the Iowa State Dental Society, in May, 1895, by Dr. Harlan. The starch and iodine test was employed. Freshly extracted teeth had their pulps removed and their foramina sealed. Root-canal dressings of coagulating disinfectants were then applied in the usual manner, and the teeth immersed in starch solution up to their anatomical necks. The characteristic blue color did not appear in the starchy solution, showing that the root had not been penetrated by the iodine. Iodine itself is a coagulator of albumen, so the experiment was also made by using the iodine alone in the same manner, omitting the carbolic acid. No indigo color appeared, demonstrating that its coagulating effect on the contents of the tubuli was an effectual bar to its diffusibility.

"It is difficult to reconcile the diametrically opposite results which seem to be obtained by Dr. Harlan on one side, and Drs. Truman and Kirk on the other. Perhaps the very complexity of the processes in experimentation, and the peculiar delicacy of the handling required, would account for some of the discrepancies. In the experiments, for instance, of Dr. Kirk, when the teeth were suspended in egg albumen, is it not possible that the apparent coagulum which is reported might not have been a growth of micro-organisms? The medium used and some of the conditions present would certainly be favorable to a culture. Then, again, a very important point seems to have been entirely overlooked. If the putrefaction of albumen has advanced far enough we no longer have albumen but ptomaines, which are not coagulable. Thus, it would be an easy matter to demonstrate either side of the question tenable according to the degree of decomposition of the animal matter within the dentine. This latter point seems to force us to the conclusion that, inasmuch as it is impossible with our present knowledge to accurately determine the stage of putrefaction with which we have to deal in a given case, the only safe course is to assume that coagulable material is present. Albuminous peptones and ptomaines are soluble in the diffusible penetrating drugs used in this condition, but are not soluble in coagulating agents unless such agents are diluted to a degree where they are no longer efficacious as disinfectants. In the investigations thus far published, the preponderance of evidence seems to be in favor of the avoidance of the coagulating drugs in the roots of pulpless teeth. The second requisite to success in the disinfection of putrid dentine mentioned was the element of time. How long should the dressings be kept in the canal before it is proper to fill the canal? Until the dentine is permeated throughout its entire depth and until all micro-organisms and their spores may reasonably be expected to be destroyed.

"My own observation is that these results are obtained in not less than twelve days, oftener sixteen or twenty, and in some few cases a longer course of treatment is required.

"The dressings should be changed every four days until no stain or odor is perceived on the cotton dressing other than the drug employed. Even though the dressing may come away clean on the fourth or eighth day, and you are morally certain that the bacteria are killed, it is imperative that the use of the drugs be continued for the full period in order to kill any spores which may be present, for they afford much greater resistance to germicides, and hence require more time for their destruction."

DISCUSSION.

Dr. Abbott.—I have been particularly interested in Dr. Wassall's paper for more reasons than one. In the first place, I am naturally inclined to defend my own position as taken in my little book that was published within the last year. I am inclined also, as a teacher, to want always the very best thing I can get in the way of treatment of diseased teeth of this kind. Let us see what scientific treatment really consists of. As I understand it, the crowning point of all scientific treatment is the result. If the result is favorable, we want nothing better as far as treatment is concerned. You may say there may be germs and spores left here and there, but suppose they are put in a condition in which they are unable to accomplish anything? We have teeth that have been going on for twenty-five or thirty years, and with the modern treatment for ten or twelve years without any disturbance whatever. Do we want anything better? We have had several stages of this scientific treatment. We had a man here not many years ago who would get up and state that the only scientific way to treat a pulpless tooth was to take a drill and go right through it, and if you could not get through that way, go through the side or anywhere, as long as the patient felt it.

Another method that was presented is the one spoken of by Dr. Wassall, that the tooth should be treated day after day. A tooth is opened, cleansed out with antiseptics, plugged up with an antiseptic, if you please, and is supposed to be cleansed of all putrefactive material at that time. You put in your dressing and leave it there for three or four days or more, and then take it out, and a fresh batch of bacteria that are always floating about are allowed to get in. It is cleansed out again, and again filled up with some material. This is done eight or ten times, and every time it is opened you allow a fresh batch of germs to get in and bring back the conditions you had when you began. In many of these cases I have taken out the material supposed to be an antiseptic plug, and had pus and blood flow out. The next point is the treatment which has been condemned in the paper, and which I practised for ten or twelve years. I have yet to see one single failure in the treatment. The moment the tooth is opened, it is put under the influence of a powerful antiseptic and kept that way from that time on, and nothing allowed to get in the canal except the material I put in as an antiseptic, and before the patient leaves the chair I fill the tooth instead of drying it out, spending half an hour or an

hour with a very uncertain procedure in drying; in fact, it is one of those things that many of the older men will agree with, when I say, it is almost impossible to dry a canal. We have tried to dry it with hot air to get all the moisture out of the canaliculi and sterilize the canaliculi. Is it accomplished? Is there anything in that practice that commends itself to a man who is constantly at work over the mouth and sees the results of operations? The very thing that is attempted to be accomplished is not accomplished. If the canaliculi were made entirely dry, the tooth would be likely to break and the enamel would probably break from the contraction. My method of treatment is one that any one can read, because I have published it in as careful a manner as I knew how. I have said nothing that practice has not fulfilled to the letter.

All teeth in which the pulps are dead, are treated and filled at once. I consider a coagulating material one of the best things to use. I consider it important that all the material in the canaliculi should be plugged up; stop all change if we can do it. I have treated abscesses in the manner in which I do now for fifteen years. Fifteen years ago a gentleman in our State society said that there was no material in the whole Pharmacopœia as valuable in the dentist's hands as chloride of zinc, and I believe he was right. No material will accomplish the work as thoroughly as that does. I use it in the treatment of alveolar abscesses, and I fill them at once, and the failures are so slight that they are hardly worth mentioning. You will not fail once in a hundred times. If that is not scientific treatment I have nothing further to say.

Dr. Patterson.—It does seem to me that any one who has seen a tooth, which has been in a diseased condition for some time, filled in the manner which Dr. Abbott describes, without any care to disinfect the zone of dentine, and afterwards examined that tooth when it is extracted, or if it still remains in the mouth (we often have to do that, entering into the dentine which has not been sterilized, and observing the condition in which we find it), ought to be satisfied that Dr. Abbott's method is an incorrect one,—that there must be time and the proper diffusible medicine to penetrate to all parts of that dentine. If it is not done we find it in a deplorable condition. The odor will reach your nostrils several feet away, whereas, if you treat the dentine with modern methods and afterwards enter the zone of dentine, you will not find it in the same deplorable condition as in the other case. That practical way of finding out the condition of the dentinal zone, after it has been treated one way and then the other, would certainly

satisfy me that the method of not paying any particular attention to sterilizing that zone of dentine is the incorrect method, and must ever remain the incorrect method. Many of the low-grade troubles which we find around the teeth in after years must, in my opinion, result from leaving the zone of dentine in that condition. I cannot conceive how it can be otherwise; and when we can sterilize it according to modern methods, according to the method described by Dr. Wassall, why should we take any risk? It appeals to my common sense, at least, and I do not propose to take any risk, because my experience has proved that it is a risk. My examination of the teeth which have not been treated by the modern method has convinced me that they are in a condition which will absolutely, in nine cases out of ten, cause some pericemental trouble.

Dr. Morgan.—I want to correct some assumptions with regard to the present treatment being a modern one. When I was a student, in 1847, I saw teeth treated by Professor Harris very much the same as they are to-day, except that he followed the method of immediate root-filling. The main difference between the treatment then and now, in the beginning, was that he drilled out and opened the root-canals as thoroughly as he was able to do; then he used an antiseptic treatment, but followed it immediately with his filling. If you examine the old *American Journal of Dental Science*, about 1854 or 1855, you will find a series of articles by Dr. Bailard, of London, in which the basal treatment that is followed now is laid down distinctly and clearly. He opened the root-canal as far as he could, which was not done with the intention of removing so much of the soft portions as he did, but it was a benefit because it was out of the way; then he treated it with antiseptics exactly upon the principle which you do now. He used the antiseptics then, and took a thread of floss silk, immersing it in the medicament, and hermetically sealed it in the cavity. When he took out his filling he took hold of the silk, and his test was the test of odor. He would treat the tooth for ten or fifteen days, and then put in a gold filling. If I had a few patients here from Nashville, I could show you some front teeth, in at least two mouths, that were filled in the early fifties, where the teeth are intact to-day and are doing good service. One of the most important matters in connection with the treatment is the differentiation as to the abnormal or normal tendencies of patients. In patients of good constitutions and bilious temperaments the teeth are retained much longer, but in scrofulous patients you have very much more trouble in getting your teeth in a proper condition to fill, and you will have results that are much

less endurable. Take the colored people of the South; you can scarcely preserve a pulpless tooth in their mouths. Take a mulatto, and you can hardly save it at all. They take on inflammatory conditions much easier, and the result is much more grave because of the loose structure of the tooth. I have been practising dentistry over fifty years, and in all that time I have seen two mulattoes, twenty-one years old, who had sound sets of teeth. Such is the predisposition to disease where there is mixed blood; such is the readiness with which they run into putrefaction that their teeth are destroyed in early life. You will find that, in our race, the teeth of those who are inclined to scrofulous diseases in any form are much softer and require more care and a closer differentiation between those that may be preserved and those that cannot. I ask those of you who use this antiseptic treatment, and keep it there for days and weeks, to look up the old journals and see Dr. Ballard's treatment. We are not using the antiseptics now that we used then, and we have made much progress in that direction and our field is being widened, but I assure you that in the main that which Dr. Patterson called "modern treatment" is not modern in the sense that it has occurred within a few years.

Dr. Patterson.—The only thing I advocated was not that antiseptics were not used, but the diffusible antiseptics which we use now instead of the escharotics and the coagulants. That was what I referred to by the modern method.

Dr. Abbott.—Dr. Patterson says if you open one of these teeth you get a disagreeable odor. There is all the difference in the world in the manner in which teeth are treated. I suppose I have treated more teeth of this kind than any man in America, and I have yet to see one that has been properly filled with oxychloride of zinc, in which there is any odor from the canal in one month, one year, or six years.

Dr. Barrett.—There is an old aphorism which, it seems to me, is perhaps the most applicable, especially in dental practice, of anything with which we are acquainted,—"The middle course is the best." I believe that to be true in the subject which is now under consideration. The question was mainly in relation to the septic conditions of dentine, not of pulp-canals, not of the decomposition of pulp-tissue, but of the dentine and the contents of the dentinal tubuli. They are of an albuminoid character. They are unorganized tissue. The fact that the remedy which I propose to use belongs to or does not belong to the class of coagulants is not that which determines my use of it. It is not that which causes me

either to use or reject it, because the albuminoid contents of the dentinal tubuli will coagulate whether you do or do not use a distinct coagulating remedy. They will coagulate spontaneously if you supply the opportunity and give them the conditions to which they will be exposed. It is the primary step in the breaking down of the dentinal tubuli of their protoplasmic contents; and when they have once melted out, which they will do with or without the presence of micro-organisms, I fear not for any putrefactive micro-organisms which can enter. They are not large enough for you to reach with a probe. They are very minute, and it is impossible for any material, the granules of molecules of which will enter into them, to do harm. Hence the septic condition of the dentinal tubuli does not worry me in the least. If I can but seal the mouths of those tubuli that is all I care for, because the amount of material at that time remaining within the tubuli is so minute that it cannot do harm if the mouths of the tubuli are sealed. There is not sufficient pressure for it to pass through, and not sufficient opening, and the chance or possibility of its passing through the interglobular spaces is so remote that it is a factor that need not be taken into consideration. Having once removed thoroughly the contents of the pulp-canal, having thoroughly sterilized it, having introduced some material that shall seal the mouths of the tubuli, I take my chances on the rest of it. It seems to me it is going into speculative philosophy a little too deep. We all want to be educated to our first best. We have enough men who are given to the second best. We must mark the limits of practicability, however, in our practice and in our reading and in our teaching, and I think we are going too far. We are neglecting more important things when we descend into the minutiæ of this to such a great extent. There is a middle course between what is called the want of scientific treatment, as recommended by Professor Abbott, and the exceedingly minute attention which is given to the subject in the paper. I am quite willing to admit that the safe side is that to which the most attention is given, and yet life is short. There are too many other things for us to give our attention to than to bestow it on these minute tubuli when the source lies in the pulp-canal. We must secure sterility from the ingress of micro-organisms into the pulp-canal.

I think every man should do the best he can. I believe every man is so constituted that he will do the best he can. I believe honesty is the normal condition of mankind, and until we have been badly instructed, until our teaching has been evil, until by precept or example we have adopted bad habits, we will remain honest, and

choose what is the best, if we act from the normal impulses which move ordinary human beings. I believe the best sense of the profession is in the line of that which is safest, of the medium course, neither eschewing, upon the one hand, the totally unscientific, and, upon the other hand, this fine splitting of hairs, which is incomprehensible to the average dentist, and yet, as one of those who desire the highest, I can most heartily commend this paper. It is exactly in the line of my own ideas, and that which I most desire to study. I think we are frittering away our energies when we spend them altogether upon the consideration of the things which are more impracticable in practice than they are applicable to the every-day work of the ordinary dentist.

Dr. M. L. Rhein, of New York.—While I am in hearty sympathy with the object and tenor of the paper, and it represents to us the present scientific aspect in reference to the septic conditions that we meet in root canals, yet as the author of the paper has seen fit to speak of a paper of mine in reference to this subject, which I read last December before the Second District Society, of Brooklyn, I feel it incumbent upon myself to take issue with him in reference to the statement he makes in regard to the effect of what he calls the coagulating material that I there recommended for washing out the canals after they have been thoroughly cleansed. In this question of the use of coagulants or non-coagulants, I coincide very heartily with the remarks of Dr. Wassall; while theoretically the use of non-coagulants seems to be the proper thing, yet taking this subject into active practice and knowing clinically the effects which we there meet, we are confronted by facts which show us that it is one of those theories which is very much overdrawn, and the actual facts do not follow out the strict line of theory. In other words, the much mooted assertion that a coagulant is a barrier to the further coagulation of the tissue beyond, has been disproved so effectually and so frequently that to my mind it has ceased to exist as a fact. At the same time, I am ready to admit that it is a barrier to the diffusibility of antiseptic remedies that we wish to diffuse through the tubuli; but the author makes a mistake when he says that a solution of bichloride of mercury dissolved in peroxide of hydrogen, which has a certain amount of muriatic or sulphuric acid in it, is a coagulant. The amount of acidity in the peroxide of hydrogen at once nullifies the coagulating effect of the bichloride of mercury, and this fact seems to escape the attention of the author. He has made a decided objection in his paper to what is known as the Schrier method,—

the mixture of potassium and sodium. I agree heartily with his remarks wherein he objects to the treatment, as outlined by Schrier, and that is, merely inoculating the putrid pulp with this material, and not removing it; but I have found no method so effective for removing every portion of pulp-tissue, to the ends of the minutest root, and for penetrating some distance into the tubuli of the periphery of the root-canal, as this mixture of potassium and sodium. There is no reason why we should avoid a good thing because the originator of it has gone a certain distance and stopped there. The only thing necessary to do after thoroughly inoculating the putrid mass with this admirable mixture of potash and sodium is to thoroughly remove the material that has been left behind. It is put in such a condition that it becomes very easy to do. The powerful effect of the potash and sodium leaves the periphery of the canal in such a state that the tubuli are to a great extent more open than with any method of cleansing the root-canals that I have yet been made familiar with, and the syringing out of that canal after the contents have been removed, with a solution of bichloride of mercury in a solution of peroxide of hydrogen, which, as I said, is not a coagulating fluid, causes the penetration of the tubuli to a very great extent of a most powerful germicidal remedy. If the condition of that root, and I quote as nearly as possible from the paper the author speaks of, has been so putrescent or there has been so much trouble beyond the end of the root as to warrant it, if a dressing of a diffusible oil like oil of cinnamon is left in that root-canal for a few days it will diffuse through the tubuli in such a root in a much more rapid manner than I have seen diffusion by any other means of root treatment that I know. I recall a case of that kind in my own family, where I received marked evidence of the cinnamon oil penetrating through the cementum of the root; the taste of it in the mouth was evident forty-eight hours after the cinnamon oil had been placed in the root-canal. The point I wished to make was that this treatment which Dr. Wassall claims is a coagulating treatment and prevents the diffusion, on the contrary, increases the rapidity of the diffusion of an essential oil through the dentinal tubuli.

Dr. Wassall.—Dr. Abbott seemed to think that no method could be entirely perfect in preventing a recurrence of trouble. The method that is the most perfect is the one which we should adopt, and we should study the question thoroughly and decide for ourselves which is the best, if we cannot get an absolutely perfect one. He claims he gets perfect antisepsis of the contents of the

tubules by the use of sublimate. I merely wish to call his attention to the fact that sublimate is precipitated in the presence of albumen, and is therefore inert. Dr. Rhein does get the effect he desires from using sublimate and peroxide, but the result probably depends on the peroxide alone.

In regard to the point made that immediate root-filling would bring forth a bad odor, I would say that while Dr. Abbott does not have that result in the cases he treats, it is due to his peculiar skill. I have removed many such fillings, and detected a bad odor. If they had been treated for a long enough period of time with diffusive disinfectants, this condition would have been overcome.

Dr. Abbott thinks that the putrefactive matter which occupies the tubules is a substance which may be ignored; that the anatomical difficulties which the interglobular space affords to the passage of putrid matter from the tubules to the cementum is sufficient. I am convinced by observation that in many teeth where the roots have been filled perfectly, that there is soreness of the tooth in the socket, and I am convinced that this is because the putrid matter in the tubules, which we are told is exceedingly poisonous when it decomposes to the extent of forming ptomaines, is the cause of that irritation. Dr. Rhein himself tells us how easy it is for the oil of cinnamon to be detected through the dentine, through the cementum, and through the gum, and be tasted in the mouth, and how easy it is for this poisonous matter to also go through the tooth.

Dr. Morgan.—Upon the assumption that the soft tissues in the tooth may be so thoroughly brought under the influence of antiseptics as never to take on putrefactive decomposition again, upon what ground do you insist upon the removal of even the pulp of the tooth after it is sterilized?

Dr. Wassall.—I do not believe that the tissues which remain in the dentine become mummified. I am speaking of the putrid state of the organic matter in the tubules. I do not think those materials should stay in the tubules, but ought to be removed. They are removed by a constant application of dressings, by a constant use for twelve or fifteen days of a process of osmosis. Four days after you take out a dressing that has been put in, you find it discolored. It is not matter that was in the pulp-canal, but it is matter that has by osmosis come from the tubules, and under the law of osmosis the drug which was on the dressings would pass into the tubules. The tubules are occupied by the antiseptic dressing after this time, and the putrefied material has entirely disappeared.

Section passed.

The chair appointed as a committee to inquire into the condition of the Dental Protective Association, Drs. Patterson, Hulbert, Perry, Morrison, and Richards.

Section VI., Physiology and Etiology, was then called, and was responded to by Dr. Patterson, chairman. Section passed.

Dr. Brophy stated that Section VII., Anatomy, Pathology, and Surgery, has not yet had a meeting, on account of the meeting of the Association of Faculties. Three papers are to be presented, the first of which is by Dr. W. C. Barrett, of Buffalo, N. Y., entitled "A Study of the Orbicularis-Oris Muscle."

Dr. Fillebrown then read a paper entitled "The Relation of the Frontal Sinus to the Antrum," and reported five cases in his practice, in which the trouble in the antrum could be traced to the frontal sinus.

DISCUSSION.

Dr. Hunt.—I only desire to corroborate some of the statements of Dr. Barrett in regard to his paper. The paper related more especially to the function of the orbicularis-oris muscle, as well as giving the minute anatomy of its structure and relation to other muscles of the face. I doubt whether we think enough about the function of this muscle. It acts differently in the upper lip from what it does in the lower lip. For instance, in speaking, the upper lip does not move very much,—hardly at all. It is only in extreme cases, or in certain individuals that the function of the orbicularis is sufficient to cause any great amount of motion in the action of the upper lip, while in the lower lip the function is increased. To make that clear to you, you will find that you can push the lower lip up beyond and over the upper lip; but you cannot push the upper lip over the lower one. As Dr. Barrett said, the fibres are not continuous fibres running directly around the cavity. If no great number of these fibres surrounded the cavity, this function would not be divided in the manner it is. Another operation of the function of the muscle is that in lifting the upper lip you cannot do it without at the same time distending it. The region of the levator muscles does not have very much action. It is very nearly in a fixed position. As Dr. Barrett has finally settled his conclusions on the conditions to be reproduced in an artificial denture, I may be allowed to speak of it, although it is not in the section of anatomy. You cannot move one muscle of the face without moving all of them. No one can act independently. They can be made to do so by an unusual education or training of some sets of

muscles, like the contortionist employs. Indications of this are found in the habit that is retained in the use of the lip by individuals long after the teeth are lost, the habit being contracted in early life from an abnormal condition of the orbicularis-oris caused by an abnormal condition of one or two of the teeth. For instance, if, in the process of the incoming of the teeth, the lateral incisor and bicuspid come so closely in contact that the cuspid does not get its normal condition, standing out in such a way that the individual contracts a habit of holding the lip in that way, that habit will continue. The cuspid tooth has a fixed position. In the chart showing the levating and nasal muscles the proprius muscle should be set a little farther back from the angulus oris. Consistency in the position of the muscles is not the rule. Variation is a common condition, and we have a variation in the position of the muscles very often in the same mouth. In studying the effect of the functions of these muscles we must study them all together for the purpose of education. You can hardly do so differently than Dr. Barrett did in the paper, taking up the function of each muscle individually, and yet they all act together. This is the point I desire to impress particularly,—that in the study of the question you must take into consideration all the muscles of the face. Whether they are in their normal position or not will have much to do with the final result. A general statement, perhaps, that will be of more value is that in the pleasing motions all the lines of the face as produced by the muscles are radiating from the central portion of the face upward and outward. In all of the disagreeable expressions these lines are downward and inward to the central portion of the face. That is the only general idea or thought that underlies the use of the function of these muscles for a final result.

I desire to speak as to the effect of the restoration of these muscles to an analogous position that they occupy normally in the mouth. In an aged person, where resorption has occurred, it is not possible always to restore these features without the extraordinary use of material. Dr. Eames, three or four years ago, made a suggestion which I think, if you will utilize it, will be of considerable value. In extreme resorption it is not alone the alveolar border that resorbs, but the muscles themselves droop. (Illustrating.) He suggested not only raising this point as high or a little higher than you ordinarily get it with an impression, but at the same time building over a hood, so to speak, not making a mass of material to correspond with this projection, simply making an inflection over

the margin of the plate. You will find the effect is simply this,—it does not restore the features outwardly, but it lifts the orbicularis-oris muscle. In doing that it naturally controls all the muscles that act with the orbicularis-oris muscle. Many of the difficulties that we have been compelled to meet will be eradicated by that method. It can even be continued in extreme cases back to the region of the last molar tooth, which will add in some cases to the efficacy of the result.

Dr. Corydon-Palmer.—The subject of adaptation to the face is one that has been my study from the time of Dr. John Allen, in 1842, when I met him in Cincinnati, all the way through his experiments, and adding to them my own, and adding his criticism on what I was doing. I am able to show you now the result. You must allow me to go back a little into history to show the things we had to use. In 1843 the artificial teeth were not furnished to us as they are now; they were in mass, and a little later they were placed in boxes, like tacks. There were no full sets. At my suggestion Mr. White put the teeth on cards, so when we wanted an incisor that was the right size we could see at once. There were no first or second bicuspids in New York in 1843, and no finishing molar. At my suggestion, the teeth were arranged on cards from the furnishing of my models. There were first and second bicuspids, right and left, and a finishing molar which had never been in existence, because in making my pieces I placed on my plate a little metal that represented what should be a finishing molar. Teeth were of different lengths and did not match. At my suggestion, the teeth were made in entire sets, and my models were afterwards copied. We then had furnished to us molars that were long enough for the restoration of the features. (Illustrating.) Supposing this represents the left superior side of the mouth. This line would lift up the muscles and bring out the features. In an ordinary piece this would go straight across. It has been my aim to bring this point forward and have it well understood. In reference to Dr. Eames's idea of raising the muscle on each side of the nose and getting a different expression in that way, his position was false. When Dr. John Allen showed me his piece, which was remarkable because he was the first one who made what was considered restoration by filling up the mouth, he did not endeavor to do more than put in a quantity of something that would fill up the mouth, but in my studies I endeavored to bring back exactly the lost portion and represent it as perfectly as I could; have it prominent where it was wanted, have it sunken where it was wanted, and so

restore the shape of what was lost by extraction or absorption. Dr. Allen said to me at Clinton Falls, where we held our meeting many years ago, when I took him aside and exhibited to him my piece, that it was all right, but I should not leave any hole for the cavity in the extension. It is unnatural and will cause a whistling sound. As is often said, nature abhors a vacuum. It must be rounded and smooth, and there must be nothing there to interfere with the articulation and the sound. So Dr. Eames was wrong in carrying up his work and folding it over. I have not put in a book what I have done, but the older men know what I have done, and I want to tell the younger men that I have given my vital forces and life energy in this work. I have never asked for any money or any design or model I have furnished. I have given everything to the associations and to the profession. I have something more that I wish to bring forward, and I will do it at your pleasure. The most important fact I wanted to bring forth is, let it conform as nearly to the original shape and form as possible. Try to exactly reproduce the lost part. Professor Barrett surprised me by making his report. I want to show you that it is true. Here is a piece which I have in my own mouth. It was made without having a brush put upon it. I trimmed it up and burnished it myself.

Dr. Barrett.—It pleased me especially because Dr. Palmer said he had never studied the names of many of these muscles, and he did not know much about it; but he has made allowance for every muscle which I have shown on my charts here to-day.

The chairman announced that the organization of sections would now take place.

Adjournment.

(To be continued.)

AMERICAN ACADEMY OF DENTAL SCIENCE.

The regular monthly meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, May 6, at six o'clock.

The society took up the discussion of subjects formulated by the American Dental Association.

Dr. Fillebrown.—Mr. President, my plan for the opening of the discussion of the questions proposed by the committee of the American Dental Association is to suggest to you an answer to each

question, which, to my mind, would be suitable to send as the society's answer. They are simply suggestions, and the society can accept them or not, as it chooses. Perhaps this plan will not meet the approbation of the Academy; if not, some one else may offer a better one during the discussion.

The first question is—

"Should not the appointment of Dental Examining Boards be under the control of the State dental societies?"

In opening the discussion of this question, all I should say would be,—

Nominations for Dental Examining Boards should receive the endorsement of the profession of the State; ordinarily the State dental societies should nominate candidates for the board.

That seems to me to be a statement of facts, and I do not think that multiplying words will make it clearer; consequently I will await your discussion.

Chairman Barker.—Gentlemen, you hear the answer proposed by Dr. Fillebrown. What is your pleasure regarding it?

If there is to be no discussion of this question, I suppose it can be considered tantamount to the endorsement of the Academy of the position assumed by Dr. Fillebrown.

Dr. Eames.—The State dental societies usually having a larger representation than the other dental societies, it seems to me that, by this broad representation of the profession in the State, more dentists could have a share in the appointment of the Examining Board than as now arranged. Therefore I move you, Mr. President, that the answer, as formulated by Dr. Fillebrown be adopted.

So voted.

Dr. Fillebrown.—The next question, Mr. President, is—

"Should not the granting of certificates of qualifications by Examining Boards to non-graduates be generally abolished?"

I would suggest as an answer:

All dental laws should require a degree as a condition for examining and license.

I firmly believe that in whatever line a person is called upon to be examined, he should have his degree, specially qualifying him in that calling, and it seems to me that if a person wishes to enter upon the practice of dentistry he should have in the first place, his certificate of graduation from some reputable dental school. This would show that he has passed his studentship and a creditable examination before his teachers. I hope my answer will be endorsed.

Dr. Werner.—Does the law in this State prescribe that the Examining Board should have degrees themselves?

Dr. Fillebrown.—No, it does not even require that dental students should have degrees.

Dr. Werner.—If you require the applicants to have a degree, should you not require the members of the Examining Board to have degrees? I approve of Dr. Fillebrown's answer. I think applicants should be obliged to have a degree, and the Examining Board itself have qualifications other than political influence.

Dr. Bradley.—I am of the opinion that several undergraduates have passed the State examination in this State, and are practising, who failed to secure their degree from the dental school. They took their examinations before the State board just previous to the examinations at the school, and, though failing to graduate, nevertheless received their certificate of qualification from the board.

Dr. Belyea.—What harm is there in allowing a man to go up for examination without having a degree? I do not see why any man who thinks he is capable of practising dentistry should not be allowed to take the examination and prove that he is worthy of registration.

Dr. Werner.—I feel the whole spirit of Dr. Belyea's remarks; at the same time we must look deeper into the question. The examining boards are an established fact, and they have an immense power. The dental colleges are beginning to feel that their decisions as to who shall practise dentistry cannot always be approved, especially in the case of students, who, if they pass the Examining Boards, do not care for the degrees. I would like to see the Examining Boards differently appointed as well as being themselves obliged to possess degrees.

Dr. Belyea.—It seems to me the gentleman is talking on the first question, which has already been discussed and passed. We are not considering the appointment of the Examining Boards now; the question is, Shall we stop a man from taking the examination to see whether he is fitted for the practice of dentistry or not? It seems to me if you stop that you strike a blow at the very foundation of justice. I do not believe in it.

Dr. Potter.—I believe that Dr. Fillebrown's answer should be accepted as the answer of the Academy to this question. If the student can get his license before he has graduated from the dental school, he will say to himself, "If the State of Massachusetts says that I am a competent dentist, why should I pay attention to these men in the dental school who are trying to make me more compe-

tent?" The importance of subsequent instruction, in the mind of the man who has already secured his license to practise previous to his graduation, must thus be lessened.

Dr. Allen.—We have known of cases of students who have passed the Board of Examiners with something less than a year's experience in dentistry,—a fact which should speak for itself in this connection.

Dr. Belyea.—That is a matter which should be regulated from other sources; that is a point where you must attack the State Board and not the students who come up for examinations. Perhaps the student was well prepared for a harder examination. I do not think it is fair, nor in the line with our customary views of liberty and justice, to prevent a man from taking an examination to see if he is properly qualified to practise dentistry simply because he has not a degree.

Dr. Williams.—The whole question seems to me to hang on this balance, whether the Examining Boards and their queries are a more thorough, more rigid test of a man's qualifications than is the examination at the close of the dental college. If the Examining Board is better qualified to judge of a man's capabilities than college faculties, then I do not see why anybody should not have the right to go before them for examination; if, on the other hand, the college faculties are better qualified to say whether a man is sufficiently capable to practise dentistry or not, then it would, of course, be advisable that the candidate for examination before the board should be required to present a degree. In some States the appointment of the Examining Board is a political thing altogether, and the fitness of the appointees is never taken into consideration. In such cases it would be hardly fair for the board to be set off against a first-class college as a judge of the qualifications of any man to practise dentistry.

Dr. Werner.—If you expect to regulate the standing of the profession, you must separate it from politics. The standard of our profession should require a certain degree of skill in the technique of dental operations, a certain amount of knowledge of parts in which work is performed, and a good moral character and reputation.

In the broad, general sense, Dr. Belyea's arguments are just; but does it tend to elevate the character and tone of the profession to admit everybody who can fill a tooth? When these Examining Boards were first created it was the result of an impetus in the profession to raise the standard; to drive men into the dental schools for their education, to stop everybody filling and making

teeth who had only a vague idea of what they were doing. That was the impetus that started the Examining Boards. After they were created it was found that they had an immense power, and that the persons possessing this power were not always acting for the best interests of the profession. A candidate comes before them whom they see for the first time; they never heard of him before, and do not know whether he has been in the penitentiary or has been guilty of some misdemeanor which should have sent him to State prison; yet he passes the examination and is afterwards known as a dentist and as one of our profession. Such persons may lower the dental profession in the minds of those knowing their character. Before allowing an Examining Board to have the power to grant to any man the name and dignity of belonging to our profession, I should want that board at least to come up to the standard which they want to impose upon others. I wish our profession in this matter could be regulated as it is in Germany. The board of medical or dental examiners is not appointed by a governor who is elected every year, and who, for political reasons, may make room for inefficient appointees,—no, sir; the board there is the very cream of the profession,—absolutely just and capable, something like our Supreme Court of the United States. Such men decide who shall enter the profession, and that's the way I would like to see the matter regulated here.

Dr. Fillebrown.—I do not think it is wise to waste too much time in discussing the side issues. The relation of the dental schools and the Examining Board is not the question to-night, neither is the question whether the Examining Boards are better than the dental faculties, but it is simply this: Shall a man be required to have passed a reasonable time in study, and to have passed a reasonable examination before his teachers and be pronounced qualified before he shall go up before the Examining Board for their approbation? Now, I, for one, believe that is where we are to come to in the future. I do not think that public opinion would sustain such a law to-day, but I think they are gradually demanding a higher standard. I do thoroughly believe it ought to be, because men will be none too well qualified even when fully up to the requirements of a graduate. I wish that we could give a unanimous vote in the affirmative on this subject,—do we think it advisable that public opinion crystallize into such a form as will require of every candidate a dental degree before he can go before a dental board for examination? I move that the answer which I have read to you be adopted.

Dr. Smith.—I cannot agree with Professor Fillebrown in his interpretation of this question. The question reads: "Should not the granting of certificates of qualifications by Examining Boards to non-graduates be generally abolished?" In other words, do we think or do we not think that the Examining Boards should have the power to say to non-graduates or undergraduates, when in their judgment it seems best to do so, "You must present to us a degree before we will examine you." Now, I hold that the Examining Board has nothing whatever to do with a man's position, other than that he be a man of good moral character; if so, and he makes proper application, then the Examining Board is in duty bound to examine him, and it should be so. I do not think that Examining Boards have the right, nor should they have the right to make any distinction in persons who present themselves for examination. I do think, however, that the matter should be controlled; but I hold that it can and should be controlled by the schools acting in concert. The schools could exercise an important influence in this matter if they would formulate a rule, which would be the rule of the National Association of Faculties, and every school would rigidly enforce it, that no student should present himself to the State Board for examination so long as he was a member of that school. That would settle the question. If, on the other hand, the proposition which Dr. Fillebrown makes and wishes us to vote upon was to become a law, that would necessitate the State in every instance requiring a degree of a man before he is eligible to his examination, and, as Dr. Belyea says, we can conceive of instances where this would be unfair. I do think that it has a demoralizing effect, for undergraduates to take the examination before they get their degree, for this reason: there are students at the end of their second year who know more about dentistry, in their own estimation, than they ever will again, and there is no doubt in their minds that they are fully qualified to practise. Such students go up for examination, and, if successful, immediately open an office. Then the attention is divided between practice and study, and the inability to devote a sufficient amount of time to either results is a detriment to school interests, a detriment to his own interests, a detriment to his patients' interests, and a detriment to the interests of the profession. I think that state of things should be abolished, but I do not see how the Examining Boards have the power to do it. The question, as I read it, is whether we think the Examining Board should or should not have the power to refuse the granting of certificates?

Dr. Fillebrown.—They cannot refuse to grant them.

Dr. Smith.—That's what I say. The question we are asked to express our opinion upon is not as to whether the faculties are better than the Exmining Boards, or whether the appointment of the Examining Board is a political matter.

Dr. Fillebrown.—It seems to me that Dr. Smith has confined his remarks to the matter of undergraduates. I do not understand that this question mentions undergraduates at all. It refers simply to any citizen of the State who is not a graduate of a dental school.

Dr. Smith.—An undergraduate is a non-graduate, and is therefore included in this question.

Dr. Fillebrown.—We are asked to express our opinion as to whether or not the granting of certificates of qualification by Examining Boards should be generally abolished. If it is abolished it must be done by State law, by legislative enactment. They have no authority to refuse to grant a certificate of qualification to any citizen of the State who passes their examination, whether he be twenty-one or forty. They have to do it. If they do not do it they lay themselves liable to the law. One of our students can go up and ask to be examined, and they have no power to refuse him. They do not ask him, by right, whether he is a student or not; and, if he passes an examination as good as the average of the men who come before them, they must give him a certificate of qualification to practise dentistry in the State of Massachusetts. I believe men should be compelled to study their profession before they are given their license to practise. I do not believe the American public is quite ready to take this position, and yet I do not believe they will be satisfied to remain long behind the place where our European friends are,—when they will demand that the examination through which a man shall pass in order to obtain his license to practise shall be severe enough to leave no doubt as to his qualification. I framed my answer, looking somewhat into the rosy future, not content with the immediate present.

Chairman Barker.—If I may be permitted to formulate what I consider the gist of the matter, I would put it in this way, Should the possession of a dental diploma be held to be a prerequisite to examination before a Dental Examining Board?

Dr. Fillebrown.—That is reframing the question, not the answer.

Dr. Smith.—I fully second that motion by Dr. Fillebrown. I have chosen to speak on this subject from a point of view different from his, because I felt that the question referred largely to undergraduates in schools; but, as the question is now put, that is really the only professional answer we can give to it.

Dr. Fillebrown.—The Examining Board has no power in this matter. You must give them this power by law. All we can do is to express our opinion as to what the law ought to be.

It was then voted to adopt Dr. Fillebrown's answer to this question.

Dr. Fillebrown.—Question three:

"To what extent is the washing of amalgam fillings an important feature in the production of a good filling?"

This answer, of course, embodies my own feelings and opinions, so far as I have been able to gather from my practice and association with my brethren for a long time.

"Washing of amalgam produces more perfect amalgamation and makes a finer and smoother filling; it also lessens the tendency of amalgam to shrink or change its form."

A member.—What do you wash it with?

Dr. Fillebrown.—Soap and water, or other alkali, or dilute acid.

Dr. Taft.—I would like to ask Dr. Fillebrown on what ground he bases his opinion that the washing of amalgam with "soap and water or anything else" will lessen its shrinkage and make it a better filling?

Dr. Fillebrown.—I did not feel that this was an occasion to go into the discussion of that point. This is merely an opinion of the Academy which is to be expressed by the vote of the greatest number. I believe that the washing of amalgam makes a better filling, some of you perhaps believe that it does not, and I think the quickest way is to come to a vote on it at once, for we may discuss it for an hour here and it will not alter our opinions.

Dr. Bradley.—I think the answer should depend somewhat upon the quality of the amalgam. Some amalgams, perhaps, need washing; with others there is no necessity for doing it. My practice is never to wash amalgams, and I think I make as good amalgam fillings as if I did wash the amalgam.

Dr. Pond.—I have made experiments, and yet I have only an opinion. I tested some of the fillings made in each way by putting them in a steel die and crushing them, but was unable to demonstrate any material difference. I do not wash the clean alloys. Some of the old alloys were very dirty, and those I wash; but the alloy I have recently used is clean and bright and makes a perfect filling, and I do not wash it.

Dr. Potter.—I would suggest that we signify in some way what we do practically in our work,—whether we wash amalgams, or whether we do not, and it will be better than to theorize as to

what the effect might have been if we had or had not washed the amalgam in certain fillings. It is evidently the wish of the committee to find out whether the majority of dentists in this country wash their amalgams or not, I think we ought to send an expression of our practice rather than of our theory.

Dr. Smith.—I do not think that Dr. Fillebrown's answer to this question is one which the Academy should be willing to send out as its own answer without first having made a scientific investigation of this matter. It may be that he has made such an investigation, and if so, we shall be very glad to hear the results he has obtained. I doubt, however, if he will claim to have done it. Now, what do we mean by a scientific investigation of this subject? It simply means this: That you must take the different makes of amalgams, mix them and insert them without washing them, and then take those same amalgams and insert them after washing them; keep a tabulated record of all the cases, and at every opportunity note the condition of all the amalgam fillings you have put in. Now, what member has done it? The member that has not done it certainly cannot give a scientific answer to my question. Some amalgam fillings where I have washed the amalgam have not turned out as well as I had hoped for. Others where I did not wash the amalgam have turned out exactly in the same way; consequently I cannot say whether it was an improvement to wash the amalgam or not. The majority of the amalgam fillings that I have put in have not been washed, and a comparatively larger number of those seemed to me to stand better than those that I did wash. I do not claim that washing did them injury; there may have been other factors which would affect the wear of the fillings, or it may have been the amalgam itself. I do not know what the cause was, because I have never scientifically investigated it, and I do not see how the society can intelligently answer this question. I do not think we ought to vote to make an answer or statement on this subject before making careful investigation of it.

Dr. Fillebrown.—I want to disclaim any intention or effort to lead the society into making statements or answers which they may not fully concur in. It was necessary to open the subject in some way so as to get the expression of the society in reference to the question asked by the committee. In this particular matter I really do not feel greatly interested; I should not have raised the question myself, and I would not have formulated an answer, except to bring it before you. You may change the answer and make it read to the satisfaction of the majority.

Dr. Eames.—I might say that I make quite a complete record of all the circumstances attending operations. I am not prepared to say just what proportion of amalgam fillings I have washed and what the result has been, but I have an idea from an examination of such after the record has been made that I have better results from the washing than in those cases where I have not washed the amalgam. It has been proposed that we state our practice. My practice is to wash amalgam, especially if it has some age. I have been told by one of the men of the S. S. White Dental Manufacturing Company that many practitioners call for an old amalgam. That, according to my mind, is contrary to both theory and practice. I want comparatively new amalgams. I understand from what Dr. Pond has said that if he has a new or a good quality, bright amalgam, one which is not oxidized, he does not wash it; if he is obliged to use one which he considers an inferior grade, he does wash it. To sum up the matter, he believes in having a clean amalgam, and that is exactly my feeling. If you have a bright surface, the mercury will flow over it freely so that it takes less to amalgamate the alloy. I believe that the less mercury you have in a filling the better the result.

Dr. Werner.—I do not want to detain the Academy on this question; I think it should be passed by quickly. As Dr. Smith has said, the society cannot give a definite answer to it; you can simply pass an opinion as to what should be good practice, and let the society give as its answer an expression of the practice of the majority. Some of us cannot vote either way.

Dr. Fillebrown.—Would it be reasonable to note the number present at the meeting this evening, and to report as our answer that so many believe that washing amalgam improves its value as a filling, and so many do not?

Dr. Smith.—Many do not know whether it does or not? I think there are quite a number of us in that situation.

Dr. Fillebrown.—Suppose that I substitute for the answer which I first made the following:

"That the society wishes to express itself as being undetermined as to whether amalgams are improved to any extent by washing or not."

Answer adopted.

Just one question more, now:

"What results are to be expected in replantation or transplantation as a means of treatment of chronic phagedenic pericementitis?"

I will say,—

"No marked results for good can be expected from replantation; the transplantation of healthy teeth into a diseased jaw will improve the condition of the relations of the tooth and the jaw."

I mean by the latter phrase that you will have a better union and a firmer tooth in the socket than the one that was taken out.

Dr. Smith.—It seems to me that this again is a question that cannot be voted upon, yes and no, by the Academy, and the vote of the majority sent to be recorded as the society's answer to that question. This is a question that must be answered by experience. What members have had the experience with this method of treating this condition of affairs? Personally, I have never had any experience whatever. I have never replanted a tooth, and I have never transplanted a tooth; therefore, I cannot vote either way.

It occurred to me that what was intended by the committee in sending out this question was to get the experience of as many as possible with this method of treatment; that experience is to be formulated; then the collector of such literature in the future goes over those statements, and a method of treatment is laid out, which, based upon experience, is declared to be the best that can be done under certain conditions. It seems to be quite wrong to put the matter in the form of a vote by the entire Academy when some of us know nothing about it.

Dr. Fillebrown.—I think the point raised by Dr. Smith is well taken. I will simply then give the answer which I have just read as my opinion, based on my own experience, of course, in a very few cases,—that is, that replantation is no good whatever; that transplantation of a healthy tooth does improve the condition.

Dr. Stevens.—How many gentlemen in the room have ever replanted a tooth which had Riggs's disease?

Drs. Fillebrown, Eames, and Draper replied that they had. Dr. Preston had extracted several teeth, filled and replaced them, and the operations were successful. In the case of an abscessed tooth in which he tried it, it was not successful. He had never attempted it where there was disease of the socket.

Dr. Eames.—I have tried replantation in a couple of instances, but they were desperate cases. I hardly think any one would resort to that until the tooth was practically lost, and that was the condition in both of my cases. They were both in the lower jaw. I replanted, after the thorough removal of any deposit on the tooth,

cleansing and repairing the socket, and I must say there was an improvement. The teeth in both cases were considerably strengthened in their positions, were firmer with considerably less soreness, but the teeth were not serviceable, and were finally extracted.

Dr. Smith.—I would like to ask why this question was put in this form? You may have a case of Riggs's disease without having chronic phagedenic pericementitis. The idea of "phagedenic" as given by Gould is that of a "rapidly spreading and destructive ulceration." We find many cases of Riggs's disease where we do not find that condition.

Dr. Daly.—I understood this question in the same way,—that is, that it referred to an ulcer.

Dr. Fillebrown.—So did I. "Phagedenic" means ulcerative.

Dr. Eames.—I will simply say that cases I referred to were not phagedenic pericementitis, as I understand that term.

Dr. Fillebrown.—Dr. Black says that phagedenic pericementitis includes Riggs's disease, pericementitis. That is Dr. Black's position, and it has always appeared to me as being a reasonable one.

Subject passed.

Dr. Clapp.—I have a large number of patients, elderly people, who had originally very good teeth. As they advanced in age there was marked recession of the gums, absorption of the process, leaving more or less of the roots of the teeth exposed. As age still advanced, there seemed to be a sort of decadence of the substance of these roots,—I suppose it would be termed scientifically a sort of a "retrograde metamorphosis." As these roots decayed, I found them very difficult to treat satisfactorily. I have used in the anterior teeth the various cements and gutta-perchas, with poor results. In few cases I have tried gold combined with cement,—crowding the first pieces of gold into soft cement that was placed in the cavity and finishing with gold after the cement had hardened. This is not a very satisfactory method for these teeth, because in many cases the teeth are loose and the operation is extensive and too fatiguing for the patient. For the posterior teeth I have used with the best satisfaction amalgam which I have placed in the cavities in combination with soft cement. As I said before, it is not to tell what I have done, excepting in matter of failures, but to receive some knowledge that I wished to bring this question before you.

Dr. Daly.—The best man to answer that question is Dr. Adams.

Dr. Adams.—I think the gold bandage is admirably adapted for such cases,—teeth where the necks are exposed and the surfaces softened. I scrape off the softened surface of the tooth, wipe it

over with a strong solution of nitrate of silver, fill the cavities if there are any, restoring the contour with oxyphosphate, and apply the bandage; and, so far as my experience has gone, it has worked very satisfactorily. Some of you, perhaps, have not heard of this operation, and if any one who has not thinks he would be interested in it, he can find the process described in the January number of the *Dental Digest*.

Dr. Clapp.—How long does it take to treat an ordinary case of this kind?

Dr. Adams.—I should think perhaps two hours. The bandage covers the whole surface, and I think the chances of any future decay are small.

Dr. Stevens.—Will not Dr. Adams give a description of his method for the benefit of those who have not read his article?

Dr. Adams.—The process is quite fully described in the article referred to, and it is probably a better explanation of it than I can give you here. I simply cut a slot in that part of the tooth which I wish to cover (this only applies to anterior teeth), and, winding the bandage around tightly, place the ends into that slot and fill the slot with gold. The bandage is made of thirty-four-gauge pure gold and lined with cement.

Dr. Stevens.—It seems to me that any one who has tried Dr. Adams's method would say at once that there can be no improvement on it.

Dr. Smith.—Do I understand you to say that it does not well apply to molars?

Dr. Adams.—I have never tried it on molars. Perhaps in some cases you could get at the first molars so as to treat them in that way.

Dr. Smith.—The most difficult cases we have are those where decay has commenced at the necks of molar teeth, extending far under the gum and following down the roots of the tooth. It is very difficult to spread such teeth and secure sufficient room; and to fill them with something that is at all lasting is an exceedingly difficult task, because, even if you succeed in clearing out the decay, it is almost impossible to keep cavities dry. If it was a cavity that communicated with the crown, you might get at it by continuing the excavation from the crown cavity, first applying the matrix; but in the cases I have just referred to you cannot use the matrix, and their excavation and treatment is a source of great discomfort to the operator and to the patient. For a long time I filled such cases with gutta-percha and cement, until I became thoroughly tired of re-

pairing and replenishing; and I then adopted the use of amalgam, and I have been a great deal better satisfied with the results, although it is by no means as satisfactory as we would like. In some cases the patient will use a toothpick rather vigorously and the gutta-percha or cement filling, which cost us so much trouble to put in, is out in an instant; and then, in some mouths the acid secretions quickly wear out the cements, so that we always feel uncertain in the use of cements in such places. Of course, those gentlemen who do not use amalgam—nothing but gold—are not troubled with this uncertainty, but just how they succeed in placing in gold in the class of cases we are referring to is beyond my understanding. I think those are cases where a man had better cast aside prejudice and use a little amalgam, providing his patients will allow it; if not, I see no other course than to put in cement and gutta-percha and resignedly accept the task of replenishing. I think it would be very interesting, Mr. President, for those gentlemen who do not use amalgam to state how they treat such cases. Some one may have a method of treating those places; if he would only tell it, that would be of great benefit to the rest of us.. At all events, I should like to hear a full discussion of these troublesome places and how best to manage them. It is a very important subject, it seems to me.

Dr. Williams.—I look upon the class of cases under discussion much as a physician would a chronic disease. He does not expect to give one dose of medicine with the expectation that it will cure the thing permanently, but that it will require a course of treatment. The course of treatment that I have followed in these cases is to fill them with an amalgam, but I make a special amalgam of pure tin. I take a piece of block tin and file it, and these filings combined with the mercury make a very soft amalgam. The object is to get an oxidation of the tin, and with a slight moisture of the cavity there surely will be an oxidation of the tin. My method is to wipe the cavity, after careful excavation, with dry oxide of tin, put in my soft amalgam, and then rub over the surface of it some regular amalgam, which gives it a better wearing surface. I do not intend, however, to allow that filling to remain permanently; I call it a treatment, and look upon it just as you would a treatment with gutta-percha or cement which is to be kept under observation for several months. At the end of that time, almost invariably, there is a greater or less degree of hardening of the dentine, then you may get a retaining point which you would reasonably expect to hold a more permanent filling. Many operators hope finally to get

this result by using cement, but the amalgam treatment seems to me to have the most direct effect in hardening the dentine in these cases,—amalgam with a good proportion of tin in it.

There is one possibility in connection with this method,—you must remember that it is very soft amalgam, and if some other dentist happens to see the filling, he would be very likely to want to know who put it in, and say " anybody ought to know enough not to use such soft stuff as that," not understanding that it was intended as a dressing as a treatment preparatory to a more permanent filling.

Dr. Stevens.—One word in regard to putting amalgam into the faces of front teeth. I do not think I could be persuaded to do it even at the emphatic request of the patient. I do not see any necessity for it when you can make porcelain inlays to fit any place of that kind which you wish to repair, and if I could not do that, I think I should prefer to cut the teeth off and put on crowns rather than have an unsightly amalgam filling exposed in the front of the mouth. I do not understand why you should have any difficulty in putting in a porcelain inlay, or why you should expect it to wash out. The cavity may be any shape imaginable, but if you bake an inlay for it, it will fit.

Subject passed.

Chairman Barker.—We will now listen to Dr. H. A. Baker, whose subject is, " Completed Regulating Case. Photographs and models. Presented as incomplete last year."

Dr. Baker.—I will commence with this case where we left off last year. I presented to you the photographs and models of this young man before anything was done. I also described to you a plan which I had mapped out for bringing the teeth into line. The lower jaw was receding and the upper jaw was protruding to the extent of something more than half an inch, so that the lower incisors hit the gum on the upper jaw nearly an inch back. I used here the Patrick system altogether. I have here the bands with which I spread the jaws and brought the upper jaw back and the lower jaw out. I waited for this case until it was ripe,—just before the eruption of the twelfth year molar, thinking it would assist in the regulation of the teeth. I put the upper band on June 29 last; the lower band I put on July 1. I then tied each tooth front of the molars to the band, and screwed the nuts up, and that spread the jaw both ways. You will see in the corrected model that I have jumped the bite about one tooth. I have seen many cases of umping the bite, but I never saw a case where it was more per-

fectly done than in this one. The upper jaw was spread about one-quarter of an inch and the lower one to the same extent. This young man has a receding chin. I do not know of any way to bring a person's chin out, or I might have attempted it and made one job out of the whole thing. August 29, about two months from the commencement of the work, I took off the anchor band and simply put on two wires, tying them to the teeth. The case was practically completed the 29th day of August.

I want to claim the originality in the matter of this retaining plate. We all know that to retain teeth is much harder than to regulate them, and to get a plate that will not produce decay is one of the difficult things that I have had to contend with in the regulation of teeth. In most of the apparatus for retaining teeth they begin in the first place by capping the teeth all over. In this upper case I simply made bands attached to the molars with a projection on the palatal surface, so that the wire from this plate snaps under there. In the lower case you will observe that the plate has come back, or the jaw has come forward (more likely the former) about one-sixteenth of an inch. In this case I made a spur running from the plate against the molar, between the molar and the first bicuspid, to prevent its going back, and it does its work beautifully.

William H. Potter, D.M.D.,
Editor American Academy Dental Science.

ACADEMY OF STOMATOLOGY.

A meeting of the Academy of Stomatology was held in Philadelphia, October 27, 1896, the President, Dr. James Truman, in the chair.

Upon the completion of routine business the President called for the report of the clinic held in the afternoon. This was read by Dr. Louis Jack, as follows:

NOTES OF PROCEDURE IN TREATMENT OF DENTINAL SENSIBILITY BY ELECTRICAL OSMOSIS.

Subject.—R. L., second molar; cavity on buccal surface, at the cervix, extending below the gum.

Condition.—Caries, with acute sensibility.

Apparatus.—Chloride of silver dry-cell battery, with Willms's controller; fifteen cells.

Obtundent.—Cocaine hydrochloride, twenty-four-per-cent. aqueous solution.

There appeared to be difficulty in securing insulation of the tooth in the absence of a suitable clamp to detain the rubber dam below the cervical margin of the cavity. This was indicated by the ampèrage as recorded being much higher than the usual reading. Ordinarily the quantity of current through the dentine does not rise above three-tenths millii, rarely reaching four-tenths. The complete effect of the current sometimes is produced by an ampèrage of one-tenth millii.

In this case two applications were made. At the first the milammeter indicated one and three-tenths millii; during the second trial, one and two-tenths millii. This result was a clear indication of leakage of current through the contiguous tissues. Notwithstanding this the result of the first application reduced the sensibility to a tolerable degree, except at the distal border. After the second application of twelve minutes the relief was complete.

The case exhibits the importance of absolute isolation of the tooth by means of rubber dam, well secured, since two applications were required where one of probably a shorter duration would have been sufficient.

Notwithstanding the evident disadvantages labored under, the clinic was a satisfactory demonstration of the value of the method of effecting obtundation of acute dentinal sensibility by cocaine electrical osmosis.

After presenting the above report, Dr. Jack read the skeleton notes of forty cases in the order in which they have been treated since April 28 of this year.

(For notes, see page 783.)

The President then called upon the essayist of the evening, Dr. William H. Trueman, who read a paper on pyorrhœa alveolaris.

(For Dr. Trueman's paper, see page 774.)

DISCUSSION.

The President.—The subjects are now open for discussion.

Dr. Burchard.—This paper, as all others which Dr. Trueman has read to us, is interesting, particularly from an historical point of view. In regard to this matter of the history of this or any other branch of science, commentators frequently fall into error as to the end and purpose of the study of the special history. Do not understand me that I underrate the achievements and studies of the preceding generations of practitioners, but we may readily and easily

overrate the force and basis of their opinions. There is nothing more common among those who spend their time in the study of the historical aspect of any science than the over-estimating the weight and importance of ancestral opinion. Those of us who have a penchant for the study of ancient literature might very readily call Democritus the father of the atomic theory instead of Dalton, or, again, might hold that some of the astronomers of the Alexandrian school were the authors of the heliocentric theory of the universe, or still again maintain that the science of bacteriology as applied to pathology is two hundred and fifty years old, when the world went germ mad; instead, we find that Copernicus, fifteen centuries after the Ptolemies, and Henle, two hundred and some years after Leuwenhoek, are given the honor of the theories named; and why? because they—Copernicus, Dalton, and Henle—did not base their opinions solely upon deduction, but furnished actual demonstration. It is demonstration, not the mere expression of opinion, which counts in science. If we note Dr. Trueman's exposition of the disease under discussion, as he states, founded upon opinions two hundred and one hundred years old, we are impressed at once with the great difference existing between the disease processes described and what to-day we call pyorrhœa alveolaris. Certainly at a time when mercurial poisoning and scurvy were common, these writers quoted included in their classifications these diseases; the therapeutics recommended clearly indicate this. To take up the discussion of the paper seriatim would require too much time; an hour and a half could easily be occupied in its direct discussion. He touches upon the etiology, clinical history, pathology, and therapeutics of the disease. As to the opinion that pyorrhœa has its incipiency in the variety of stomatitis described by Dr. Trueman, the necrotic stomatitis of children, his own proposition gives denial, for while stating that pyorrhœa is rare before middle life, he assigns as a probable cause a disease of childhood. The pathology of the disease under discussion is its interesting feature. We must start with the premise that pyorrhœa alveolaris is a generic term, naming but one symptom common to many diseases; but it has come to be applied to describe a tolerably constant set of morbid conditions, and if we are to give due credit for its description it should be given to Dr. Riggs, who first differentiated this disease from the many other conditions which did and do affect the teeth. At the present day, we may place the disease conditions which cause the loss of teeth through a molecular necrosis of pericementum under three heads: the first of these is where the disease begins at the gum margin and

advances towards the apex of the root, causing progressive necrosis of the pericementum, and ultimately the loss of the tooth; the advance of the disease and also its early stages are marked by the deposition of dark scaly calculi, which follow the receding pericementum. The next class of cases are those causing the condition named by Dr. Darby gouty pericementitis; these begin upon some lateral aspect of the pericementum; with the margins of the gum unaffected, from a necrotic focus, the molecular death of pericementum radiates until the teeth are dislodged; commonly deposits are found in the necrotic focus, although they may not be; when pyogenic organisms gain entrance, pus formation is grafted upon the first necrosis. These are the cases in which a family and personal history of gout, rheumatism, rheumatoid arthritis, or lithæmia are elicited.

The next class are those described by Dr. Black, in the "American System of Dentistry," as phagedenic pericementitis, in my opinion one of the best and most descriptive titles in dental nomenclature. The pathology, clinical history, and prognosis bear a close relationship to the preceding class.

In the matter of therapeutics, Dr. Trueman has cited methods of treatment, applied in the past, which indicate that the disease conditions present were entirely different from any of those included under the three classes named.

In dealing with pyorrhœa we are not dealing with a specific disease, and therefore it is irrational and useless to look for a specific remedy. Specific remedies apply only to specific diseases, instead of having such a condition as implied in the latter. We are confronted with a tolerably constant set of surgical conditions, each of which calls for appropriate therapeusis. If we discover a cause, predisposing or exciting, this is, of course, removed; but besides this, there are conditions each of which requires appropriate treatment.

The President.—It is to be remembered that we have two subjects for discussion this evening,—the paper and records of Dr. Jack relative to cataphoresis, and this one of Dr. Trueman's. We have had much of pyorrhœa in the past year or two, and if no further discussion of that subject is desired, we will pass to the consideration of Dr. Jack's clinic and his records.

Dr. Burchard.—In view of the number of papers which have been read by Dr. William H. Trueman upon the history of dentistry, and his well-known interest and studies in that field, it no doubt impresses all of us that he is the one eminently qualified to give

dentistry what it has not and what it needs,—a systematic history. If appropriate, I would suggest that the voice of this society express to him a conviction that it is actually his duty to do this work and to begin it at once.

The President.—That is very interesting and important, but it is not strictly in order at this time.

Dr. Jack.—There was one incident of great significance in the records which I have presented this evening, and that is, the effect of the cocaine in the case of pulp congestion cited in Cases XIII. and XVI. After the application of the current the approach to the pulp was made painlessly, the passage of the drill into the pulp-chamber denoted by the absence of resistance to the instrument was painless. The body of the pulp was removed without pain, but all attempts to extract the apical half of the pulp were futile, owing to the pain induced at every application of the broach. Further attempts to obtund by the cocaine solution and current were without avail, and an application of tannin and oil of cassia was made to the pulp remnant.

Dr. Guilford.—On an average, how much time do you allow for the inducement of the analgesic state?

Dr. Jack.—The records show an average of about twelve minutes. In some cases the time is slightly less; in others it is somewhat longer. It will readily be recognized that, although a great deal of time appears to be consumed in rendering the dentine anæsthetic, it is a relative and not an actual expenditure, for in many of the more obdurate cases, without cataphoresis, an hour might be expended in a fruitless attempt at proper excavation, and even then be unaccomplished. Under the cocaine cataphoresis the parts may be worked upon at pleasure within some fifteen or twenty minutes at the utmost.

Dr. Guilford.—In what percentage of cases do you resort to cataphoresis?

Dr. Jack.—Only in those cases which exhibit an acute or persistent resistance to the action of our common obtundents, the number of cases in which its application is imperative is limited to those which are acute and which from this contra-indicate the ordinary means of reducing sensibility. The great value of electrical osmosis consists in the fact that in all cases the effect extends deeply in the dentine, whereas in acute cases obtundents and escharotics are limited to comparatively superficial action.

Question.—Do you use guaiacol in combination with cocaine?

Dr. Jack.—No. Its odor is very objectionable, and the conductivity of the aqueous solution of the cocaine hydrochloride, and in some cases the citrate, permits the ready passage of the current. Guaiacol, as I understand its properties, is a more indifferent conductor than these solutions.

Dr. Burchard.—Dr. Jack, you spoke of the benefit of cocaine cataphoresis in connection with pulp-capping. I believe it is your practice to cap pulps which have been the seat of active hyperæmia.

Dr. Jack.—Yes; always, provided, of course, the vascular disturbance has not exceeded hyperæmia. I may say that increased attention as to dentinal sterilization is a feature of increasing importance in the conservative treatment of the pulp. I bestow greater attention and more time to sterilization than formerly.

Dr. Roberts.—I noted in the clinic to-day that, while there was a short circuit through the tooth, as shown by the high reading of the milammeter, there was still enough current passed through the tooth to produce complete anæsthesia. This seems to indicate that it is not necessary to completely insulate the tooth, or else the analgesia of the dentine is produced by the action of the cocaine introduced by way of the gums upon the nerves themselves before they enter the tooth. It is to be noted that the patient felt the negative electrode held in the hand.

Dr. Register.—Is there any advantage in using a saturated solution of cocaine, or are the best effects noted in any definite percentage?

Dr. Jack.—The twenty-four-per-cent. solution seems the most efficient, particularly in shortening the period of time required. Its efficiency may be due to its higher conductive power. Necessarily the conductivity of a strong solution of the salt would be greater than the conductivity of a weak solution of the salt.

Dr. Register.—I notice that you have used two salts of cocaine, the hydrochlorate and the citrate. Has either an advantage over the other?

Dr. Jack.—I have used both experimentally to determine their comparative efficiency, but I do not find any apparent difference in their effects upon dentinal sensitiveness.

The President.—I think Dr. Woodward must have some interesting data as to the value of the cataphoric current.

Dr. J. A. Woodward.—I have used electrical osmosis with cocaine solutions for obtunding sensitive dentine since May, 1896. A twenty-per-cent. aqueous solution of the hydrochlorate of cocaine is

usually employed. Practically any strength of solution from saturation to five per cent. is effective.

The current is from a No. 11, thirty-five cell, constant current, galvanic battery, furnished by the Chloride of Silver, Dry-Cell Battery Company, of Baltimore, Md. The No. 11, twenty-five cell battery would be more convenient, as it is divided into groups of five cells. My practice has been to use seven or fourteen cells (equivalent to one volt per cell) to commence with. Should the current from fourteen cells, at the first contact point of the current-controller, cause too much sensation or pain, the number of cells is reduced to seven, and the current again turned on and slowly increased until the current from the seven cells can be passed through the tooth without any sensation. The key of the current-controller is then returned to the "start," and seven additional cells switched in the circuit, and the current again turned on. This is slowly increased until sensation to the current ceases, when the key of the controller is carried to the extreme of the contact points to drive the cocaine into the dentine for two or three minutes. By this method some cells can be successfully brought under control which will not bear the current from fourteen cells, the number generally used. All living teeth are sensitive to the electrical current in various degrees, some patients bearing twenty-five cells (twenty-five volts) without any discomfort, and others only seven. Seven cells have been sufficient, at the fourth contact point of the current-controller, to secure absence of sensitiveness in the dentine; more time than usual, of course, is required with so light a current. Pulpless teeth appear to bear any amount of current. I have frequently turned on them the whole thirty-five cells (thirty-five volts) of my battery without any sensation being experienced by the patient. Place a living tooth in that amount of current and the patient instantly flinches,—an excellent test for a living pulp. Up to the present time I have obtunded the dentine in seventy cases. I have not always succeeded in securing complete absence of sensitiveness in excavating, but have reduced it to a degree easily borne by the patient. For extremely sensitive teeth, for extremely sensitive patients, who either cannot or will not submit to the preparation of cavities in their teeth, electrical osmosis is at its best. In these cases the patient at the end of the sitting is as fresh and free from nervous fatigue as at its commencement, and as for yourself, the relief is so great that you will be astonished at the strain you have been subjected to in trying to secure satisfactory operations for this class of patients. The average time has been for fifty cases

fifteen and a half minutes. When it is considered that these are the patients for whom an obtunder is positively demanded, the time of the whole operation is not very materially prolonged. Patients of this class are so glad to be relieved of pain that any reasonable addition of time is a matter of no consequence.

Adjourned.

Henry H. Burchard,
Editor Academy of Stomatology.

Editorial.

DECEMBER THOUGHTS.

The reflections that come to all, as nature robes herself in the garment of approaching winter, are of the past year, its work and the estimate which must be placed upon it. Retrospection is not always profitable, yet it must ever be suggestive to the thoughtful mind. It means a personal criticism, an accounting, so to speak, for all the omissions and commissions that have been for the good or ill of the individual or the community with which he is surrounded. To the professional laborer it means more than this, for it should recall to him the sense of the responsibility that belongs to him as a part of the great work, and the question should be ever present, Has the labor allotted me been performed with an ever-present aim for the good of my calling, and with a loftier aspiration for the greatest benefit possible to those intrusted to my care?

That which is true of the individual is equally true of the profession represented. The twelve months should indicate progress in many directions, for, if this be not apparent, it means a retrograde, and this is not in harmony with the spirit of the age.

A review of the work performed in dentistry, in the period named, is not possible here, nor would it be desirable, for each worker can decide for himself whether this labor has been satisfactory or otherwise. That the year 1896 has not been a barren year must be conceded, but that it has been a prolific one, either in the professional or greater world around us, cannot be admitted.

Dentistry, as far as the United States is concerned, has been passing through a crucial period. It would seem, as we read its

history for the past year, to have been, at times, under a cloud, and yet when the work is examined in detail, it compares very favorably with other years in the past. While this is true, there has been an apparent sluggishness, a lack of vitality, disclosed in professional work not altogether encouraging. Why this should have been more manifest this year it is difficult to determine, but, if it be true, it indicates not so much a lack of interest in the work, as it shows a feeling to exist that old methods of procedure have had their day and the active minds are looking for other avenues and other means whereby the profession may be advanced. It is certainly true that the tendency has been rather towards a selfish isolation, a feeling that dentistry has reached a period when it does not require the united efforts of every individual, but can be left to itself, or, in other words, to those who have grown old in the service. This idea, if entertained, is a wrong one, for it is only by the admixture of new blood with the old that the body can maintain a healthful activity. This retrogressive tendency has been manifested in an indifference to organized effort, perhaps more so here than in any other direction. Meetings have not exhibited the vitality of the past, in fact, have at times dragged heavily. Papers covering new lines of investigation have not been plentiful in our local, State, or national organizations, indeed originality has been sadly lacking in the work of the year. While this should not be a depressing fact it is not a pleasant reflection. The consolation, if any is to be found, must rest in the conviction that mind as well as nature must lie fallow at certain periods that in the end better results may be attained. It is hoped that the present lukewarmness may be the precursor of that greater awakening yet to come.

Three years yet remain to us of the present century, and dentistry should see to it that the end be worthy of the great era, perhaps the greatest in the world's advance in civilization.

It must not be understood that, in the opinion of the writer, the year nearing its close has been wholly unproductive. In many directions, professionally speaking, it has merited much honor. Some things have been accomplished which give hopes of important results for humanity, notably the final demonstration, practically begun last year, of electrical osmosis. This seems to promise to do for dentistry what anæsthesia did for general surgery, and if this prove true, it marks an epoch in its life hardly second to anything that has preceded it.

The silent reaper has been active during the past twelve months, and a number of those who have added interest and strength to

our calling, have joined the host of the immortals. This, while it weakens the band of the faithful, must not be a source of anxiety, such has ever been and will ever be in this changing life. It, however, should be the incentive to more active work. The new dentist coming forward from college training, with his more thorough scientific methods, is the man of the future, and to these the right hand of fellowship must be given that the gaps in the ranks may be worthily filled, and that the eternal and ever-ascending spiral may be towards greater perfection in every branch of our work.

The year has given its share of new books. These have generally been above the average and indicate a decided growth in that direction. Books may truly be said to be the measure of professional depth, and, if this be true, the signs are hopeful for the future, for the supply indicates a higher demand than has existed in the past. The periodical literature has been steadily improving, if we except those journals that feed principally upon the crumbs falling from other tables, but even these are manifesting a desire to rise above their origin, that of trade, and it is to be hoped they will eventually succeed.

The colleges have steadily advanced their standards, and with new buildings and broader curricula there is abundant hope that the coming dentist will be thoroughly grounded in the work of the profession.

Thus, as the winter falls with his icy mantel upon us, the prospective warmth of the spring of the new year gives confident anticipations that the budding of leaves will show that a newer and more productive activity is for us in the future, and may we all rise to meet it with an energy worthy the life of 1897, which is yet to be.

THE SEPARATION OF THE NATIONAL ASSOCIATIONS.

The *Dental Practitioner and Advertiser* probably voices the opinion of some members of the National Association of Dental Faculties when it advocates, in the October number, "that the educational bodies should convene at a time different from that of the meeting of the American Dental Association." Indeed, it has gone so far that the chairman of the Executive Committee has deemed it of sufficient importance to send out a circular letter to the members of that Association to secure an opinion for or against a change of time of meeting. The reasons why such a change should be made

are given in the editorial of our contemporary, as follows: "The sessions of the educational bodies greatly detract from the interest of the national professional meeting. Some of the best men in dentistry are members of both. The National Association of Dental Faculties meets and must meet first. The members are tired out when the American assembles, . . . their non-attendance is noted, and they are decidedly missed. . . . It is, then, undoubtedly for the interest of the American Dental Association that it should be relieved of the harassing and perplexing presence of the educational associations."

The main facts as here stated cannot be controverted, but is the remedy suggested the only or the proper one?

To call the meeting of the American Dental Association at one period in the year and the educational bodies at another and in an entirely different place means, in the opinion of the writer, practical death to one or both. If the National Association of Dental Faculties decided to change its time of meeting, the delegates from colleges would be obliged to attend. All these have long distances to travel, and many long journeys involving heavy expense and physical exhaustion. If, then, the separation proposed should be finally decided upon, what would, in all probability, be the result? The men comprising the membership of the National Association of Dental Faculties would refuse to take two long journeys in one year, and, necessity compelling attendance at the "Faculties," they would naturally neglect the other.

Now, these men connected with colleges are, in the main, the life of the American. Without their aid it is questionable whether this Association could be maintained as a national body. This, it is believed, is admitted by all conversant with its affairs.

Aside from this, the inspiriting presence of several related organizations is a decided benefit. The only meeting of the National Association of Dental Faculties that ever convened independently was the one at Chicago, and it was the least valuable, from any point of view, that has ever been held by that organization.

There should be no change in the arrangement of meetings, except in one particular. The next meeting of the American Dental Association, at Old Point Comfort, will be a very important one, and should have a full attendance, free from other entanglements. The suggestion we would make would be for the Executive Committee, or the officers having authority, to issue a call for the meeting of the educational bodies one or two days earlier than usual. The

American does not meet until Tuesday, and it has been customary to call these associations together on the previous Saturday. This allows but two days for the completion of their work. If these bodies were called to meet on Thursday it would give them ample time to finish by Saturday. This would give the members two days of rest before the work of the National Association began,—a time sufficient, it may be supposed, for all practical purposes of recuperation.

It is very questionable whether the Executive Committee of the National Association of Dental Faculties would not exceed its authority were it to call, this year, a midwinter meeting. If any change be made it must first be adopted at the regular annual meeting, and we protest in advance against any such arrangement being settled, by correspondence, as a violation of the policy and methods governing that organization. It is to be hoped that there will be a decided objection to any such irregular work.

Bibliography.

A Practical Dental Metallurgy: A Text and Reference Book for Students and Practitioners of Dentistry. By Joseph Dupuy Hodgen, D.D.S., Assistant to the Chair of Dental Chemistry and Metallurgy, University of California, College of Dentistry, etc. San Francisco: The Hicks-Judd Company, 1896.

The author of this volume of three hundred and eight pages says, "In presenting this little volume to the practitioner and student of the dental profession the author does not flatter himself that he is filling a void in such literature, or that a crying need has been felt in the profession for this particular production. . . . The endeavor has not been to furnish a scientific and exhaustive treatise on metallurgy, but rather to present in a clear and practical manner the principles of that subject as the author sees them related and applicable to the every-day wants of the dentist."

While it is true that this branch of dental study has been ably presented in the "American System of Dentistry," and the more practical work of Professor Essig, there is a satisfaction in feeling that the demand for metallurgical knowledge has grown to such an

extent as to induce the preparation of this book. The increase of information in this direction by dentists has by no means been in proportion to the age of the profession; indeed, it is questionable whether the metallurgical knowledge of to-day can be compared with that of forty years ago, when every individual practising dentistry was obliged to have some intelligence in this direction. This largely died out during the interregnum between the advent of rubber and the introduction of crown- and bridge-work.

Dr. Hodgen has completed his task carefully, and, it is believed, with a conscientious regard to the wants of the student. It must be judged solely as a text-book, and in this view it should not be subject to the ordinary rules of criticism governing a larger treatise.

Dr. Hodgen is to be congratulated on this his first effort at book-making, and there is no reason why it should not find a place among the text-books of our dental colleges.

NOTES ON THE HISTORY OF ANÆSTHESIA. THE WELLS'S MEMORIAL CELEBRATION AT HARTFORD, 1894. EARLY RECORD OF DENTISTS IN CONNECTICUT. By James McManus, D.D.S. Hartford, 1896.

This history of anæsthesia was prepared at the request of the Connecticut Valley Dental Society, and comes very appropriately before the public at a time when the dispute as to the origin of anæsthesia seems to have been revived by the recent Boston celebration, where all honor was given Dr. W. T. G. Morton. It seems to the writer of this that Dr. McManus's clear statement should carry conviction that Dr. Horace Wells was the true discoverer of anæsthesia, and that whatever merit belonged to Dr. Morton must be found in the introduction of ether through the aid of Dr. C. T. Jackson.

The book gives the history of the celebration in honor of Wells, held at Hartford, December 11, 1894, and also an account of the unveiling of the tablet presented to the city of Hartford, and erected in the building in which the important event occurred. This tablet was designed by E. S. Woods, of Hartford, and cast in bronze by Mr. Mossman, of Chicopee, Mass. An excellent illustration of this is given on the first page.

The record of Connecticut dentistry from 1800 has been a labor of love to Dr. McManus, but it will prove of great historical value to the dentists of that State. The work of the author has been greater than the size of the book would indicate, and is deserving

of unstinted praise. If the other States would do a similar work in collecting, it would furnish a basis for the historical student of the future.

A True History of the Discovery of Anæsthesia. A Reply to Mrs. Elizabeth Whitman Morton. By G. Q. Colton. New York, 1896.

This is a pamphlet of decided historical value, and should go with that prepared by Dr. McManus. Dr. Colton is probably the only living witness of this original effort to produce anæsthesia by Dr. Wells, hence anything from his pen on this subject is to be prized.

Obituary.

RESOLUTION OF RESPECT TO THE MEMORY OF DR. E. A. STEBBINS.

A committee of the Northeastern Dental Association, consisting of Drs. C. T. Stockwell, George A. Maxfield, of Holyoke, Newton Morgan, Edward S. Gaylord, of New Haven, Conn., and W. H. Jones, of Northampton, reported the following resolution in memory of Dr. E. A. Stebbins, of Shelburne Falls, who died during the year:

Whereas, Every member of the branch of this Association, which constituted the old Connecticut Valley Dental Society, must realize that we meet to-day under the shadow of personal grief. It is scarcely probable, however, that there should be any one present who will not share in some degree in the sense of loss and sorrow that comes to us, as on this occasion especially we recall the fact that Dr. Stebbins is dead. To us of the Connecticut Valley Society there was but one Dr. Stebbins. He needed no other designation in the rich association and experience of a long and eventful past. He needs no other now. No meeting was quite complete if Dr. Stebbins was absent. But who of us can to-day recall a meeting when he was not present from beginning to the end, ready always to bear his portion and more than his portion of whatever burdens there might be to share, and also to contribute of his rich store of wisdom, sound judgment, and experience, freely, modestly, generously, nobly. As a dentist we respected and honored him. As a professional man he stood very near, if, indeed, he did not reach the true type of the ideal. As a man, he was an abiding inspiration. On whatever side we met him his touch was life and evermore life. Unostentatious, courteous, courageous, dignified, cor-

dial, ever helpful in spirit towards all, but as true to his convictions and his sense of right and duty as the rock-ribbed mountains that so gloriously encircle his newly-made grave. We loved him.

Resolved, That our secretary be requested to convey to Dr. Stebbins's widow and children the assurance of our sympathy in this common loss and sorrow.

DR. E. L. CHILDS.

Dr. E. L. Childs died at Conway, Mass., May 27, 1876, of cancer of the mesentery.

He was a native of Massachusetts and studied dentistry with Dr. E. Lincoln Clark, now of Dubuque, Iowa. He commenced practice in Pittsfield, Mass., and subsequently removed to Brooklyn, N. Y., and again to Nebraska, when failing health compelled a return to his former home in New England among the mountains of Conway.

My first acquaintance with Dr. Childs was in the city of Brooklyn. When the Brooklyn Dental Society was organized he engaged in its work with much enthusiasm. This society has never been excelled for its usefulness in advancing real professional merit, and the profession in Brooklyn owe much to it for its advanced standing in dentistry.

To Dr. Childs's work we accord a large share of approbation for the part he was always ready to perform. This society being one of our own creation, we are pleased to pay a just tribute to those who were associated with us in its successful development.

G. Alden Mills.

New York.

Current News.

NORTHEASTERN DENTAL ASSOCIATION.

The Second Annual Meeting of the Northeastern Dental Association was held at Springfield, Mass., October 21, 1896. About one hundred members were present. This Association was formed last year at Worcester, by the union of two associations that had occupied the field for many years. These were the Connecticut Valley and New England Dental Associations.

Three papers were given at the afternoon session, one by Dr. P. W. Moriarity, of Boston, on "Fractures of the Jaw," one by Dr. A. J. Flanagan, on "College Administration," and one on "Cataphoresis in Therapeutics," by Dr. Henry E. Waite, of New York City.

The following officers were chosen at the afternoon session: President, Dr. James H. Daly, of Boston; Vice-Presidents, Drs. D. B. Ingalls, of Clinton, and George A. Maxfield, of Holyoke; Secretary, Dr. Edgar O. Kinsman, of Cambridge; Assistant Secretary, Dr. A. J. Cutting, of Southington, Conn.; Treasurer, Dr. George A. Young, of Concord, N. H.; Librarian, Dr. George F. Cheney, of St. Johnsburg, Vt.; Editor, Dr. C. W. Strang, of Bridgeport, Conn.

The retiring president, Dr. James McManus, of Hartford, delivered the annual address at the evening session. He referred briefly to the formation of the Association, and urged the importance of loyalty to the State, district, and national societies. He spoke of the useful work of the old societies, and showed the importance of sustaining the new society,—that has for its field New England. The help from the society to the member should be practical, theoretical, scientific, and social. After the president's address, Dr. Arthur J. Wolff, of Hartford, Conn., bacteriologist to the Hartford Board of Health, gave an interesting illustrated lecture on "Bacteria." The address was a very profitable one from a scientific point, treating, as it did, not only of general principles, but of special forms of germ growth.

Geo. A. Maxfield, D.D.S.,
Secretary.

NEW JERSEY STATE DENTAL SOCIETY.

At the Twenty-sixth Annual Meeting of the New Jersey State Dental Society, held at Asbury Park, N. J., July 29–31, inclusive, the following-named officers were elected: President, Harvey Iredell, D.D.S., New Brunswick, N. J.; Vice-President, J. L. Crater, D.D.S., Orange, N. J.; Secretary, Charles A. Meeker, D.D.S., Newark, N. J.; Treasurer, Geo. C. Brown, D.D.S., Elizabeth, N. J.

Chas. A. Meeker,
Secretary.

INDEX TO VOLUME XVII.

U.

V.

W.